DRAFT

SAMPLE LOCAL ZONING REGULATIONS FOR PROTECTION OF SAND DUNES

PLANNING & ZONING CENTER, INC.

Mark A. Wyckoff, President
Carolyn Freebury, Admin. Assistant

MICHIGAN NATURAL RESOURCES COMMISSION

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LAND AND WATER MANAGEMENT DIVISION

Dennis J. Hall, Division Chief

Chris Shafer, Chief, Great Lakes Shoreland Section
Jim Ribbens, Chief, Coastal Programs Unit
Christy Fox, Resource Specialist

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Prepared by

Mark A. Wyckoff, AICP

Planning & Zoning Center, Inc.
400 Everett Drive
Lansing, MI 48915-1106

517/484-3333

In Cooperation With:

Coastal Zone Management Program
Land and Water Management Division

Department of Natural Resources
Box 30028
Lansing, Michigan 48909
Dennis J. Hall, Chief

517/373-1950

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Mark A. Wyckoff, AICP
Lansing, MI
August 1987

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3	**Special Environments: A Handbook**, West Michigan Regional Planning Commission, 1977, p. 29.
11	(*top*) **Michigan Guide to Performance Controls for Great Lakes Shorelands**, AER, for DNR, 1976, p.37. (*bottom*) **Special Environments: A Handbook**, West Michigan Regional Planning Commission, 1977, p. 29.
13	**Norton Shores Zoning Ordinance**
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18	(Figure 3) Parabolic Barrier Dune Formation, **Dune Type Inventory**, Report of INvestigation 23, by William R. Buckler, for Geology Division, DNR, 1979, p. 18. (Figure 4) Barrier Dune on USGS Base Map by Geology Division, DNR in **Barrier Dune Formation Areas**, undated (*left*), and Sand Dune Designated Areas, Geology Division, DNR, undated (*right*).
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26	(*top 2*) **The Role of Vegetation in Shoreline Management: A Guide for Great Lakes and Shoreline Property Owners**, Great Lakes Basin Commission, undated, p. 20, 21. (*bottom*) Adapted from **Stream Sites, Buying, Building & Care**, DNR, undated, p.25.

27 (*top*) **Planning Guidelines for Residential and Path Development in Michigan's Sand Dunes and Wetlands**, Roy Mann Assoc., for DNR, 1975, p. 10.
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29 Graphic from **Beach Dune Walkover Structures**, Marine Advisory Program, Florida Cooperative Extension Service, December 1976, cover.

30 (*left and bottom right*) **The Role of Vegetation in Shoreline Management: A Guide for Great Lakes and Shoreline Property Owners**, Great Lakes Basin Commission, undated, pp. 8, 22.
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46 **Planning Guidelines for Residential and Path Development in Michigan's Sand Dunes and Wetlands**, Roy Mann Assoc., for DNR, 1975, p. 14.

INTRODUCTION

There are two primary purposes of this report. First, it seeks to identify the characteristics of sand dune development that lend themselves to regulation inorder to minimize the negative impacts of development on Michigan's unique dune lands. Second, it presents sample ordinance language to accomplish this purpose. It is a companion report to **Managing Sand Dune Development: State & Local Options**, by the *Planning & Zoning Center, Inc.*, Lansing for the Michigan Department of Natural Resources; December 1986, 71 pages.

Chapter One is repeated from the companion report (cited above) where it appeared as Chapter Eight. It lists current efforts by Michigan municipalities to regulate sand dune development within their boundaries.

Chapter Two presents five alternative zoning techniques that can be used to regulate sand dune development. Each is briefly discussed and its merits and limitations identified. The elements of sand dune development regulations currently in effect in sixteen (16) Michigan communities and in three (3) other out of state jurisdictions are also presented.

Chapter Three reviews thirteen categories of technical regulatory considerations unique to sand dune development. This Chapter presents explanatory and background information for the sample overlay zoning ordinance presented in Chapter Four.

Chapter Four includes sample zoning provisions representing one approach - overlay zoning - to regulating both common and uncommon forms of sand dune development. Provisions for variances and nonconforming uses are included. Some of the sample zoning provisions may be repetitive of provisions already present adequate in a particular zoning ordinance. As a result, not all of the sample zoning language in Chapter Four is likely to be needed in every community contemplating sand dune development regulation. Additionally, some communities may find an entirely different approach, such as separate districts or planned unit development is more appropriate to guide sand dune development in their community.

Chapter Five elaborates on those considerations which may suggest variation from the sample regulations in Chapter Four when they are being adapted to fit the circumstances in a particular community.

This report was completed in August 1987 prior to the passage of pending state legislation which may require the implementation of specific dune regulations. As a result, any reader should insure prior to using the sample ordinance language presented in this report, that it has not been modified or preempted by State legislation.

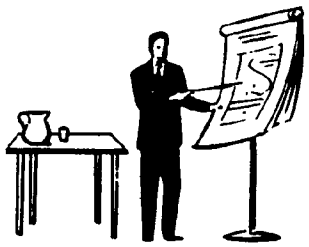
The need for the sample zoning regulations presented in this report exists because of widespread development activity that is not sensitive to the unique and fragile character of Michigan's sand dunes. Failure to carefully site structures on dune lands poses risks to the safety and health of future occupants as well as possible irreversible destruction of the dune environment.

Michigan has over 270 miles of sand dunes along Great Lakes shorelines, most of it along Lake Michigan. While this represents the greatest such assemblage along fresh waters in the world, the overwhelming majority of these shoreline parcels are in private ownership. Much of the balance in private ownership has already been intensively developed, in many cases to the total destruction of the natural dune environment. However, long stretches of dune shoreline remain relatively open and available for development, especially north of Muskegon. A typical development approach is to use a bulldozer to level dunes in order to provide good building sites with clear views of Lake Michigan. These efforts not only destroy the dune lands but also often expose the new development to the ravages of wind and water erosion. Rare and unique plant communities suffer irreparable harm, the climate tempering effect of rolling dunes may be lost and exposure to more rapid erosion during periods of high lake levels (like the present) grows. Of equal importance is the loss of valuable open space and a natural appearing shoreline, a critical element to the maintenance of a strong shoreline tourist economy that is oriented to water based recreation and nearshore outdoor activities.

Water is a strong attractor for recreation, residential and some (mostly tourist oriented) commercial activities. The fact that the land bordering the water is a sand dune, is often incidental to the desire to build adjacent to the lakeshore. As a result, left unchecked, shoreline development can be both hazardous for the future occupants and extremely destructive of the dune environment.

In 1976 the Michigan Legislature passed the Sand Dune Protection and Management Act, PA 222 of 1976. That law regulates the mining of sand in designated dune areas and charged the Department of Natural Resources with doing additional studies to identify measures that could further protect the dunes from inappropriate development or use. Subsequent efforts by a citizen's Sand Dune Advisory Committee urged DNR policy changes in 1985 (which were adopted), and the development of sample zoning regulations. This report is in fulfillment of that charge.

The sample zoning regulations in this report present the first systematic attempt to identify those elements of development that can unnecessarily destroy unique dune resources while also establishing minimum standards for development that seeks to both minimize dune destruction and still permit a reasonable use of privately owned dune lands. It is fully expected that as more detailed information on the physical and biotic characteristics of sand dunes and adjoining land uses becomes available that a more site specific, performance oriented approach to dune development regulations will be able to be developed. As a result, these sample regulations should be viewed as interim regulations suitable for use until more site specific techniques, based on much more detailed information, can be developed.



Any dune development regulations will be much easier to tailor to the unique attributes of dune lands and existing land uses in a community if they are based on sound planning. Prior to adoption of these sample zoning regulations, or a variation of them, a community should either prepare a specific dune management plan or amend the existing master or comprehensive land use plan to address dune management considerations. The information gathered and analyzed as a part of that process will provide the basis for the specific dune regulations ultimately adopted.

Chapter One

CURRENT LOCAL ZONING EFFORTS

This chapter briefly examines the results of two recent surveys of communities with sand dune areas designated according to the provisions of PA 222 of 1976, the Sand Dune Protection & Management Act. While only 16 communities appear to have adopted specific provisions to protect development in sand dunes, their efforts are extremely important in preparing a comprehensive sand dune management strategy for Michigan and for identifying appropriate elements for local zoning provisions.

Sand Dune Zoning Survey Results

In the first quarter of 1986, staff of the Land Resource Programs Division of the Michigan Department of Natural Resources sent out a survey to each local governmental unit with boundaries within series I, II or III designations under PA 222. Most of these communities are in the lower peninsula along the eastern shoreline of Lake Michigan, a few are in the upper peninsula along Lake Michigan and Lake Superior. The survey inquired about any zoning provisions that apply specifically to development in sand dunes. A follow-up letter went out to local units not responding to the original request. The 1986 survey followed a similar survey of most of the same governmental units in early 1984 which inquired as to local regulations of sand mining operations; it was conducted by the Geological Survey Division of the Department of Natural Resources. The results of both surveys are listed in Table I. Unfortunately, by not surveying all coastal communities, there is no way of knowing whether local units of government in undesignated sand dune areas may already be applying special sand dune development regulations.

Of the 13 cities and villages, and the 54 townships surveyed in 1986, 25 responded, while 10 of 18 counties also responded. The 1984 survey contacted 12 counties, forty townships and 12 cities and villages. Forty-eight communities responded to the 1984 survey.

Sand dunes regulations from three jurisdictions who did not respond to either survey were tabulated since they were already on file with the project staff. Additionally, several communities responding to the 1984 sand dune mining survey had sent along entire zoning ordinances (not just mining regulations). These were examined and where sand dune development regulations were identified, they were included in this inventory. While no effort was made to verify if all dune regulations are still in effect, they are tabulated with that presumption.

Sixteen ordinances have specific regulations over sand dune development. Four are in Berrien County and are all slight variations of model provisions drafted originally by the Berrien County Planning Department. One is from the Covert Township zoning ordinance in Van Buren County. Two are in Allegan County; one is Saugatuck Township, and the other is the Village of Saugatuck. Two are in Muskegon County and include the City of Norton Shores and Laketon Township (both were prepared by the same out-of-state consultant and draw from a Wisconsin model shorelands protection ordinance). Two are in Oceana County and include Claybanks Township and Pentwater Township. Three are in Benzie County and include the County ordinance (covers 3 townships), the Crystal Lake ordinance (nearly identical

Table I

SURVEYS OF COMMUNITIES IN DESIGNATED DUNE PROTECTION AREAS

Jurisdiction	Designated Dunes (Series #) I,II,III	1984 Survey Response	Sand Mining Controls	1986 Survey Response	High Risk Erosion Controls	Dune/ Shoreline Devel. Controls
BERRIEN CO.		N.S.	?	Y	—	N.R.
Chickaming Twp.	I	Y	S.O.	Y	—	N
Lake Twp.	I	Y	N.O.	Y	Y	Y
Lincoln Twp.	I	Y	S.O.	Y	Y	Y
Hagar Twp.	I	Y	S.O.	Y	Y	Y
Stevensville		N.S.	?	Y	—	N
Bridgman	I	Y	Z.O.		—	N.R.
VAN BUREN CO.		N.S.	?	N.R.	—	N.R.
Covert Twp.	I	Y	Z.O.	N.R.	—	N.R.
S. Haven Twp.	I	Y	N.O.	Y	—	N
ALLEGAN CO.		N.S.	?	Y	—	N
Laketown Twp.	I	N.R.	?	N.R.	—	N.R.
Saugatuck Twp.	I	N.R.	?	N.R.	—	N.R.
Douglas	I	N.R.	?	Y	—	N
Saugatuck	I	N.R.	?	N.R.	—	N.R.
OTTAWA CO.		N.S.	?	Y	—	N
Park Twp.	I,II	Y	N.C.	N.R.	—	N.R.
Spring Lake Twp.	I	N.R.	?	N.R.	—	N.R.
Port Sheldon Twp.	II	Y	N.C.	Y	Y	N
Grand Haven Twp.	I,II	Y	Z.O.	N.R.	—	N.R.
Grand Haven	I	N.R.	?	Y	—	N
Ferrysburg	I	Y	S.O.	Y	—	N
MUSKEGON CO.		N.S.	?	N.R.	—	N.R.
Laketon Twp.	I	Y	Z.O.	Y	Y	Y
Norton Shores	I	N.R.	?	Y	Y	Y
Muskegon	I	N.R.	?	N.R.	—	N.R.
Roosevelt Park	I	Y	N.O.	N.S.	—	N.R.
OCEANA CO.		N.S.	?	Y	(prepared but not implemented)	
Claybanks Twp.	I	Y	Z.O.	Y	—	N
Benona Twp.	I	Y	Z.O.	N.R.	—	N.R.
Golden Twp.	I	Y	N.O.	N.R.	—	N.R.
Pentwater Twp.	II	Y	Z.O.	N.R.	—	N.R.
Pentwater	II	N.R.	?	Y	—	N.R.
MASON CO.		N.S.	?	Y	Y	N
Pere Marquette Twp.	I	N.R.	?	Y	Y	N
Hamlin Twp.	I	Y	Z.O.	N.R.	—	N.R.
Summit Twp.	II	N.R.	?	N.R.	—	N.R.
Grant Twp.	I	N.R.	?	N.R.	—	N.R.
Ludington	I	N.R.	?	Y	—	N

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Jurisdiction	Designated Dunes (Series #) I,II,III	1984 Survey Response	Sand Mining Controls	1986 Survey Response	High Risk Erosion Controls	Dune/ Shoreline Devel. Controls
MANISTEE CO.		N.S.	?	Y	—	N.R.
Manistee Twp.	II	N.R.	?	Y	Y	N
Onekama Twp.	II	Y	Z.O.	Y	Y	N
BENZIE CO.		Y	Z.O.	N.R.	—	N.R.
Blaine Twp.	II	Y	C.Z.	N.R.	—	N.R.
Gilmore Twp.	II	N.R.	C.Z.	N.R.	—	N.R.
Crystal Lake Twp.	II	Y	Z.O.	N.R.	—	—
Lake Twp.	II	Y	Z.O.	N.R.	—	N.R.
Platte Twp.	II	Y	C.Z.	N.R.	—	N.R.
Elberta	II	Y	Z.O.	N.R.	—	N.R.
Frankfort	II	Y	N.C.	Y	Y	N
LEELANAU CO.		N.S.	?	Y	—	N.R.
Centerville Twp.	II	N.S.	?	N.R.	—	N.R.
Cleveland Twp.	II	Y	Z.O.	N.R.	—	N.R.
Empire Twp.	II	Y	Z.O.	Y	Y	N
Glen Arbor Twp.	II	N.R.	?	N.R.	—	N.R.
Leelanau Twp.	II	Y	Z.O.	Y	—	Y
Leland Twp	II	Y	Z.O.	N.R.	—	N.R.
Empire	II	Y	N.O.	Y	—	Y
CHARLEVOIX CO.		N.S.	?	N.R.	—	N.R.
St. James Twp.(B.I.)	III	N.S.	?	N.R.	—	N.R.
Peaine Twp. (B.I.)	III	N.S.	?	N.R.	—	N.R.
EMMET CO.		Y	Z.O.	Y	—	N
Wawatom Twp.	II	N.R.	C.Z.	N.R.	—	N.R.
Bliss Twp.	II	N.R.	C.Z.	N.R.	—	N.R.
Cross Village Twp.	II	N.R.	C.Z.	N.R.	—	N.R.
Readmond Twp.	II	N.R.	?	N.R.	—	N.R.
Mackinaw City	II	N.R.	?	Y	—	N
MACKINAW COUNTY		N.S.	?	Y	—	N
Brevort Twp.	I	Y	N.O.	Y	—	N.R.
Hendricks Twp.	I	Y	N.O.	Y	—	N
Moran Twp.	I	N.R.	?	Y	—	N.O.
CHIPPEWA CO.		N.S.	?	N.R.	—	N.R.
Bay Mills Twp	III	N.S.	?	N.R.	—	N.R.
LUCE CO.		N.S.	?	Y	—	N
McMillan Twp.	III	N.S.	?	N.R.	—	N.R.

Table I

SURVEYS OF COMMUNITIES IN DESIGNATED DUNE PROTECTION AREAS

Jurisdiction	Designated Dunes (Series #) I,II,III	1984 Survey Response	Sand Mining Controls	1986 Survey Response	High Risk Erosion Controls	Dune/ Shoreline Devel. Controls
SCHOOLCRAFT CO.		N.S.	?	N.R.	—	N.R.
Manistique Twp.	III	N.S.	?	N.R.	—	N.R.
Doyle Twp.	III	N.S.	?	N.R.	—	N.R.
Mueller Twp.	III	N.S.	?	N.R.	—	N.R.
ALGER CO.		N.S.	?	N.R.	—	N.R.
Burt Twp.	III	N.S.	?	N.R.	—	N.R.
KEWEENAW CO.		N.S.	?	N.R.	—	N.R.
Allouez Twp.	III	N.S.	?	N.R.	—	N.R.
Houghton Twp.	III	N.S.	?	N.R.	—	N.R.
Eagle Harbor Twp.	III	N.S.	?	N.R.	—	N.R.
Totals	**NA**	**Yes = 34** **N.R. = 22** **N.S. = 29**	**S.O. = 4** **Z.O. = 18** **N.O. = 7** **N.C. = 3** **C.Z. = 6** **? = 47**	**Yes = 36** **N.R. = 47** **N.S. = 1**	**Yes = 12** **No = 0** **— = 72**	**Yes = 7** **No = 22** **N.O.= 1** **— = 54**

N.S. = Not Surveyed
N.R. = No Response
N.C. = Not Covered
C.Z. = County Zoning
S.O. = Separate Ordinance
Y = Yes
N = No
Z.O. = Zoning Ordinance
N.O. = No Ordinance
N.A. = Not Applicable
— = Not Asked and Can't Tell
? = Don't Know Because Wasn't Surveyed Or No Response Was Received

with the County ordinance) and the City of Frankfort ordinance. The last two are the Leelanau Township and the Village of Empire ordinances from these Leelanau County communities.

The principal contents of the sixteen identified sand dune development regulations are displayed in Table II. Eleven of these ordinances use overlay zones, four are separate (conventional) zoning districts (the City of Frankfort Critical Environmental District, the Claybanks Township Coastal Zone District, the Saugatuck Township Lakeshore Residential District and the Covert Township Shorelands One-Family Residential District) and one is a PUD ordinance (Empire). The four in Berrien County are integrated with High Risk Erosion Area requirements under the Shorelands Protection and Management Act, PA 245 of 1970, while the Leelanau Township ordinance relies heavily on an environmental impact analysis process for its protection. Many of the ordinances also authorize PUD's in sand dunes, all permit single family homes. All have restrictive provisions related to removal or alteration of native vegetation, almost all greatly restrict grading and filling. All have special slope or erosion control provisions. Most do not directly address aesthetics outside the purpose statements, but clearly consider them in building height, siting and vegetation requirements. The Laketon Township ordinance regulates development on high bluffs the same as development in sand dunes.

No community permits development lakeward of either the foredune, or the minimum high risk erosion area line. All require development in dunes set back at least 90 and up to 200 feet from the foredune ridge, bluffline, floodplain line or edge of permanent vegetation. Most also regulate location of wells and waste disposal facilities, accessory structures, access drives, pathways, and tree cutting for views. One prohibits off-road vehicle access, several regulate the type of structure permitted on steep slopes, and three differentiate between locations on high versus low dunes. All appear to have been enacted in the last ten years. Of these communities, only Saugatuck Township and Onekama Township have received formal state approval of their high risk erosion area ordinances, but several other communities have included high risk erosion area setbacks in their ordinances, relying on the DNR data even though their ordinance has never received DNR approval.

Effectiveness of Present Approaches

Each of these communities deserves special commendation for recognizing that sand dunes are a unique environment that requires separate and special consideration in the development review process. One curiosity of Table I is the fact that three communities responding to the survey indicated that they have no regulations over development in sand dunes, and yet it turns out they do. Several considerations could explain this inconsistency. First, in some communities the responsible local zoning official did not prepare the response. Second, there could have been miscommunication because in some communities special shoreline, or environmental regulations focus more on the water aspects of the environment than on the dunes, despite the fact that the regulations still would apply to dune as well as other near-shore areas. Another reason could be because the area of dunes in the community is small, and hence it may have been felt that they were insignificant in a statewide survey. Of course, the possibility also exists that other communities responding that they had no dune regulations actually do. If so, it is unfortunate that they are unable to be included here.

Table II

LOCAL DUNE & BLUFF ZONING REGULATIONS

Jurisdiction	Type OV = Overlay SD= Separate District	Permitted Uses	Lot Width	Lot Area	Set Back	Water Supply & Waste Disposal	Accessory Uses	Shore Protection Devices	Vegetation Restrictions	Filling & Grading Controls	Slope Restrictions	Foredune & Exposed Face Construction
BERRIEN COUNTY		Est. by underlying district	Est. by underlying district		low dune=90'-110' high dune=90'-110'	U.D.	wooden stairways	requires special use permit	max 30% removal in setback area	no dune or bluff leveling or sand/soil removal in setback area		none permitted
Hagar Twp.	OV	requires special use permit			+1' for each foot >60' from bluff=90'	–	walls, fences cannot detract from shore appearance		no clearcut more than 30' for each 100'shore		–	
Lake Twp.	OV				Platted area= variance to 75'	–					–	
Lincoln Twp.	OV					–					–	
Chickaming Twp.	OV					–					–	
VANBUREN CO.	SD	SFR, farms parks, other SUP		5 acres	or behind HREA setback	Health Dept.	No spec reqs.	—	90% must be retained w/n 200' of shore	—	—	—
Covert Twp.												
ALLEGAN COUNTY		Lakeshore residential uses	100'	20,000 sq. ft. more for MF	per high risk erosion overlay in this district	per Health Dept. but not on flood poor land	—	requires SUP & SPR	planting req. in open sand & non stabilized soils	---	-soils must be stable -must minimize nat.veg.damage & risk of erosion	
Saugatuck Twp.	SD											
Saugatuck Vlg.	OV in open space zone	Single family PUD camps by specific use	200'	2 ac 10 ac 20 ac	no closer than foredune ridge or 40' from edge of perenial veget.	setback w/princ. structure	raised boardwalks		-raised construc. in open sand -replanting of disturbed areas	no altera of dune-crest	roads & paths must be in troughs	no structures in shifting dunes

SUP = special use permit
SPR = site plan review
U.D. = underlying district

MHWM = mean high water mark
OHWM = ordinary hi gh water mark
CUP = conditional use permit

SIR = site investigation report

Jurisdiction	Type OV = Overlay SD= Separate District	Permitted Uses	Lot Width	Lot Area	Set Back	Water Supply & Waste Disposal	Accessory Uses	Shore Protection Devices	Vegetation Restrictions	Filling & Grading Controls	Slope Restrictions	Foredune & Exposed Face Construction
MUSKEGON COUNTY Norton Shores	OV special soils/ sands basis	R-3 (devl) Cluster (PUD) Recreational	Est. by U.D.	Est. by U.D.	120' from bluffline	setbk w/princ. structure	U.D.	CUP	max. 20' strip can be clearcut	Prohibited in most situations	spec regs on slopes>12%	none permitted
Laketon Twp.	OV on R-1 Res.	R-1 Resid.	Est. by U.D.	Est. by U.D.	100' from bluff on top of dune	setbk w/princ. structure	Special regs.	CUP	max. 50% of width of lot to 35' deep maybe circut. Must protect nat view from H_2O	Prohibited in most situations	spec regs on slopes>12%	
OCEANA COUNTY Claybanks Twp.	SD/ OV	residential & ag all req SPR	U.D.	20,.000 sq.ft.	100' from bluffln exc. in platted subdivision	150' from mean hi H_2O mk 200' for non-res&MF	U.D. & SPR	SPR	-no circutting between bluffln & H_2O -must pres nat veg	no excav. on slopes >25%	no septic tank on slope >8%	SPR
Pentwater Twp.	OV	U.D.	U.D.	U.D.	200' from 50 yr. fldplain limit (584.4 ft)	landward of bldg	U.D.	—	OK to remove dead trees, must pres. nat shurb as far as prac.	—	—	—
BENZIE COUNTY (Blaine & Platte Twps) Crystal Lake Soils Basis	OV OV	U.D. affects land 1000' inland of Lake MI		2 Acre min. if septic used	100' from MHWM	150' from MHWM	U.D.	—	removal dead trees or selective cutting of 40% only by approved forester	restricted	15% slope max allowed unless approved by Arch or Engin	
Frankfort	SD	Same as P-1 R-1A dists or SUP uses	R-1A. Dist.	R-1A Dist	200' of OHWM	elsewhere	—	—	—	—	—	—

SUP = special use permit
SPR = site plan review
U.D. = underlying district

MHWM = mean high water mark
OHWM = ordinary hi gh water mark
CUP = conditional use permit

SIR = site investigation report

Jurisdiction	Type OV = Overlay SD= Separate District	Permitted Uses	Lot Width	Lot Area	Set Back	Water Supply & Waste Disposal	Accessory Uses	Shore Protection Devices	Vegetation Restrictions	Filling & Grading Controls	Slope Restrictions	Foredune & Exposed Face Construction
LEELANAU COUNTY	OV	U.D.	U.D.	U.D.	Hi risk erosion are a setback	U.D.	U.D.	—	U.D.	U.D.	U.D.	U.D.
Empire Vlg.	PUD	any use in R-1, R-2 Rec-1 or Ag-1 dist	—	5 acres no comm unless 720 ac	from use dist. via PUD	Health Dept.	via PUD Proc.	—	via PUD	via PUD	via PUD	via PUD
Leelanau Twp.	OV soil type basis - areas w/n 500' shr	U.D.	U.D.	areas > 3 req EIS	100' from MHWM	150' from MHWM	U.D.	—	40% selected cutting w/appr of Forester	—	slopes > 15% req Arch or Engin approv	—
Glynn County, Georgia	OV inld to trees 20' hi	U.D.	U.D.	U.D.	40' of crest stable dune	U.D.	U.D.	by SUP	none (but advocated in Co Plan)	none landward of setback sand excav by SUP	— —	
Lane County, Oregon	OV	U.D.	U.D.	U.D.	50' from MH tide, more when site invest. rpt reveals need	U.D.	U.D.	—	must be min. disturbance	—	No devel perm. on slopes>25% Spec SIR	—
Oregon Model Ord.	OV	U.D.	U.D.	U.D.	est. by site invest rept at pt. behind active dunes where at least 40 yrs of protection	SIR	U.D.	—	SIR	SIR	SIR can't block backlot views	not in active dunes

SUP = special use permit
SPR = site plan review
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MHWM = mean high water mark
OHWM = ordinary hi gh water mark
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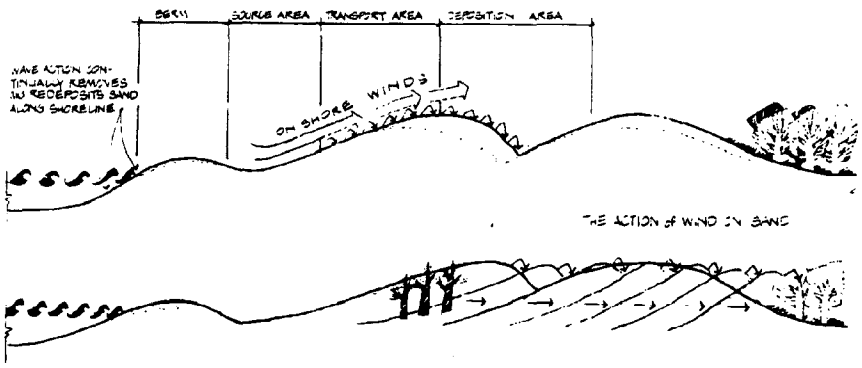
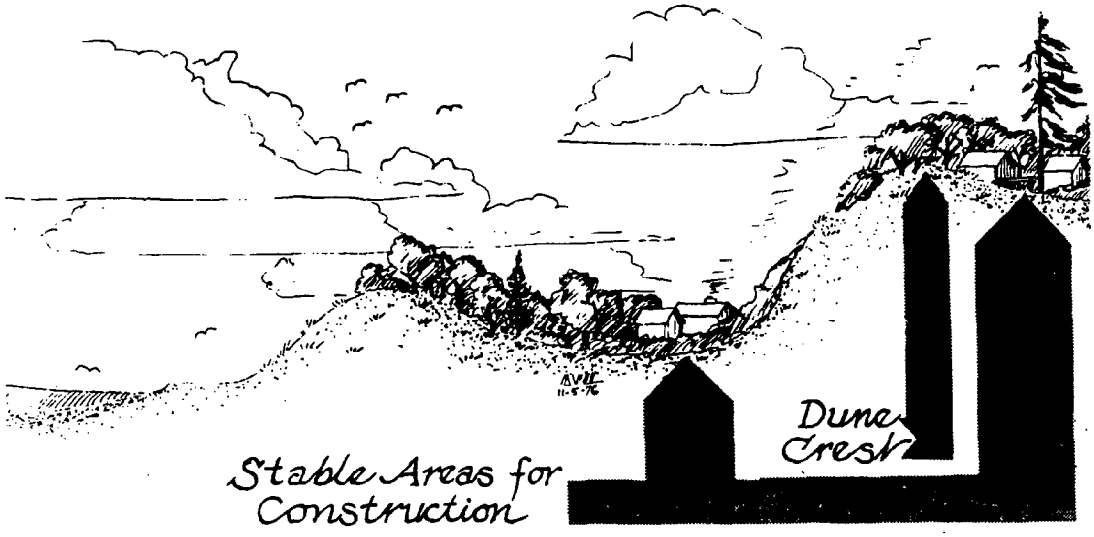
The types of ordinances used in these sixteen communities are explained in Chapter Two. The specific elements of good sand dune development provisions are addressed in Chapter Three.

Active Sand Dunes



NATURAL PROCESSES: ACTIVE DUNES



Chapter Two

ALTERNATIVE ZONING TECHNIQUES

There are five principal zoning techniques that communities utilize for regulating development in sand dunes. They include an overlay zone, the separate zoning district, planned unit development regulations, special land use permits, and site plan review procedures. Site plan review procedures could be utilized with each of the other four techniques. These are not the only options that exist, but it is felt they represent the most likely ones to be considered by municipalities and are the only ones currently in use as indicated by the survey results reported in Table II in the last Chapter.

The authority to utilize separate sand dune districts and overlay zoning district approaches is found in each of the three Michigan zoning enabling acts. The following example comes from the Township Rural Zoning Act:

> *"provide by ordinance for the regulation of land development and the* ***establishment of districts which apply only to land areas and activities which are involved in a special program to achieve specific land management objectives and avert or solve specific land use problems****, including the regulation of land development and the establishment of districts in areas subject to damage from flooding or* ***beach erosion****, and for that purpose may divide the township into districts of a number, shape and area considered best suited to accomplish those objectives."* PA 184 of 1943, as amended.

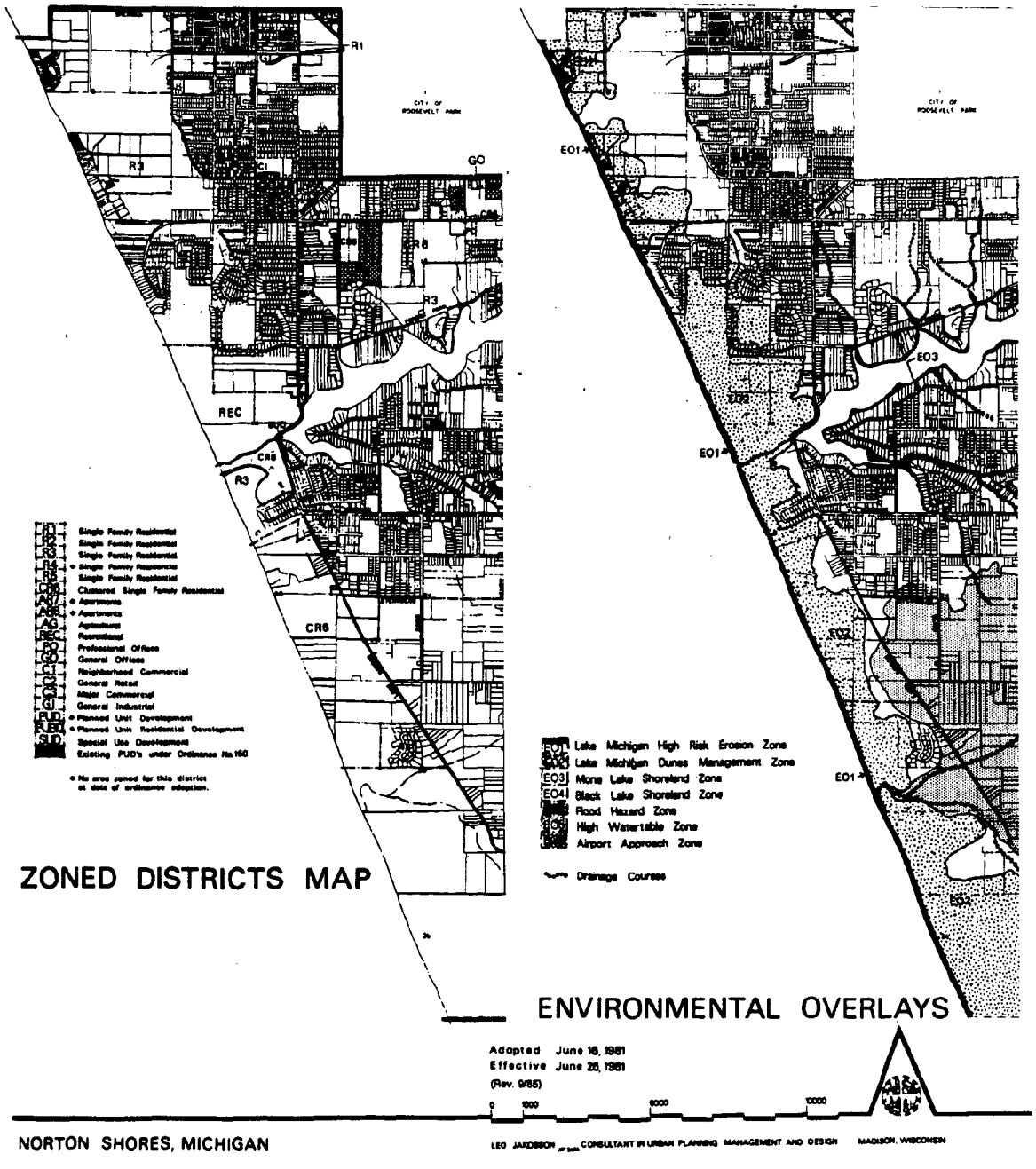
The zoning enabling acts also provide specific authority for the use of special land use, planned unit development and site plan review techniques. There are a number of specific due process and delegation of power considerations that must also be complied with. These include: proper advance notice of the public hearing prior to ordinance adoption or amendment, or issuance of a discretionary decision; requirements for who can make the final decision; the need for standards in the ordinance; and requirements for documentation of the decision. These procedural issues will not be specifically addressed in this report, but they are an important part of any zoning decision. Consultation with local legal counsel will be necessary to insure procedural conformance with statutory requirements.

Overlay Zone

An overlay zone (or overlay district) is a set of regulations that apply in addition to the regulations of an "underlying" zone. This technique is applied most frequently to achieve various public objectives in sensitive environments, such as floodplains, wetlands, earthquake areas, etc. The existing pattern of permitted land uses established in the underlying zone is not disturbed by the overlay zone. Where a more restrictive standard exists in the overlay zone, then it applies -- superseding the standard in the underlying district. For example, a house proposed for construction on a lot zoned residential may be required to be set back 25 feet from a rear lot line, but if the lot were to fall within the geographic area affected by a floodplain overlay zone which required a minimum 100' setback from a floodway, then the house would have to be set back 100' in order to meet the more restrictive standard in the overlay zone. One of the principal advantages of the overlay zone approach is its flexibility in dealing with natural hazards without disrupting a carefully designed zoning scheme which may be seeking to achieve a good balance or

mix of land uses, and/or land use compatibility. Such a scheme could be negatively affected if instead, a separate, new zoning district were to be introduced in an area. Most of the ordinances identified in Table II use the overlay zone approach, as does the sample zoning ordinance in Chapter Four. Figure 1 depicts how the shoreline of Norton Shores has both separate zoning district and overlay regulations.

FIGURE 1

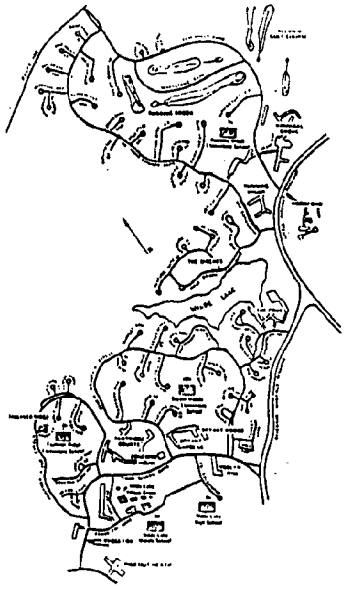


Separate Zoning District

The separate zoning district is the time tested way to deal with lands and land uses that share common characteristics. Concerns about equal protection are easily handled when all similarly situated lots are subject to the same set of regulations. However, if adjoining land uses, or new infrastructure (such as a sewer line or road) present new opportunities for intensive use of certain lands, a common district may not be a feasible approach. The Saugatuck Township and Claybanks Township ordinances use a separate district approach. In these townships a separate district uniformly zones all shoreland properties, since single family residences are effectively the only permitted use. One negative attribute of this approach presents itself when property is rezoned to another district and the second district has no special sand dune protective measures. The possibility of this happening is great enough that from the perspective of statewide interests, ***an overlay zone approach is a surer form of protection***, since no matter how many times the underlying districts were changed, the sand dune overlay requirements would still apply.

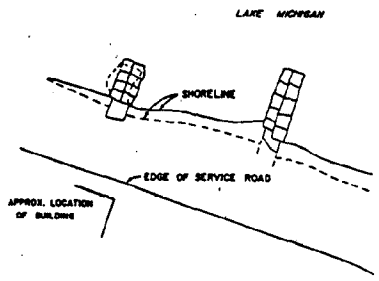
Planned Unit Development

Planned unit development (PUD) is a term used to describe techniques which permit development on a site with far fewer rigid lot by lot standards than typically apply in a conventional zone. This permits the developer considerably more design flexibility than is usually available. This flexibility usually results in a design that clusters residential units in a serviceable location while leaving more of the site in open space than is otherwise usually achieved. The developer is often offered an incentive to develop using a PUD approach. The incentive is usually a higher density or other relaxed standards, although there is no statutory limitation that says a PUD form of development could not be the required form when the public interest so directed. The type of standards used in review of PUD's are usually more akin to performance standards than the more traditional numerical or dimensional standards found in most zoning districts. A PUD can be a separate zoning district or processed similarly to a special land use under Michigan's zoning enabling acts. Site plan review is required for all PUD's.



Special Land Uses

Special land uses are uses of land which are permitted in a particular district when certain standards, stated in the ordinance, have been met. In sand dunes, all land uses could be declared to be special land uses and thus be subject to a special review process. Site plan review is statutorily required for special land uses. Several of the sand dune ordinances reviewed in the previous chapter rely on the special land use approach, but largely just for shore protection devices and other accessory uses. Prior to construction of shore protection devices, a separate application and review must be performed. In order to use special land uses in an ordinance, the ordinance must specify the uses permitted by special land use permit, the approving body or official, the standards required for review and approval, and the procedures established for review and approval. Both discretionary and nondiscretionary standards are permitted. If the applicant meets the standards in the ordinance, then the use must be approved.



PLAN VIEW OF CHARLES MEARS STATE PARK
PENTWATER, MICHIGAN

Site Plan Review

The site plan review process is a method for insuring that a specific development proposal conforms to local, state and federal requirements. It is the process of examining documents and drawings to insure that each of the

standards in the ordinance have been met as they apply to the proposed development on the property in question. Site plan review is required to be used in review of special land use and planned unit development proposals. The ordinance must specify who is responsible for review and approval, what the application requirements are, and what the standards are for review and approval. Again, approval must be granted if the requirements of the ordinance have been met.

Site plan review provides the greatest amount of control over a prospective development and is the best way for insuring that "*what you see on the site plan is what you get on the ground*", provided of course that field inspections after approval are adequate. Effective site plan review requires standards that are both flexible and discretionary, yet clear enough for a developer to have guidance as to what is permitted/prohibited. Again, in sand dune areas, performance standards may be the best approach.

Performance standards establish a level of impact or achievement above or below which a particular use or activity may not be established. For example, instead of an ordinance requiring a rigid height requirement for buildings, it might take a performance based approach instead and say, "*the height of a structure shall not exceed the height of surrounding dunes" or "be readily visible from (the shore) above the natural height of dunes in the area*". While this standard may be too rigid in an area of low dunes, it may be appropriate to consider in areas of high dunes.

Summary

In summary, these five techniques and combinations thereof, provide the primary means for development of zoning controls in sand dune areas. The overlay zone technique least disrupts the existing zoning pattern; the separate district approach most uniformly treats all sand dune areas; the PUD approach gives the greatest flexibility to the developer but also the greatest design control authority to the decision body; the special use permit is best suited to control particular and unusual land uses; while site plan review will need to be used with each of the other four techniques in order to insure dune development is accomplished in a manner that is sensitive to the limitations and uniqueness of the environment.

Chapter Three

REGULATORY CHARACTERISTICS OF SAND DUNE DEVELOPMENTS

A companion report, **Managing Sand Dune Development: State and Local Options** establishes the public purposes and need for sand dune development regulations and associated definitions of key terms. Reviewing these purposes one finds regulation of sand dune development is needed to reduce the unnecessary destruction of Michigan's sand dunes and to insure development that is safe and secure. The instability of sand dunes and the hazards of the near shore environment present unique problems for safe development. Careful siting will protect sand dunes and keep public costs associated with remedial and emergency measures low. The natural beauty of sand dunes contributes significantly to the economic base of Michigan's shoreline communities with the wealth of recreational and tourist activities they offer. Nevertheless, there are a few land uses whose public benefits are so great that they may need to be located in a sand dune. As a result certain water dependent land uses may need to be permitted even in sand dune environments. Additionally, achievement of these public purposes which attempt to balance public and private interests, also secure the benefits of a tranquil, natural, continuous dune environment for property owners within designated sand dune areas.

It is now appropriate to turn our attention to those characteristics of dune development which need to be the focus of specific regulation. Among the most important characteristics are **land use, density** and **lot width**, and a variety of specific siting considerations ranging from suitability for wastewater disposal to type, location and extent of vegetation on the site. These characteristics, taken together, describe the relationship between the physical and spatial aspects of development and a dune. These characteristics need to be evaluated through a comprehensive site plan review procedure in order to determine: 1) what impacts the development proposal will have, 2) whether those impacts are within acceptable limits as defined by ordinance requirements, and if they are, 3) what conditions, if any, are necessary to insure that the development will proceed in a manner which is least destructive of the dune environment while still being compatible with adjacent uses of land. These items can be viewed as a *checklist of considerations* that must be examined before development approval should be given.

This discussion presumes certain kinds of development are compatible and hence permissible in sand dunes. Where there are unique dune complexes or large areas with unique plant communities, then no private development may be appropriate and compensation to the affected landowner may be necessary. This suggests a serious planning effort should precede dune regulation in every jurisdiction (or by the state for the entire shoreline) to first identify which dunes, if any, should not be privately developed and what actions should be taken to insure that is achieved. Additionally, some dune lands may be more sensitive to development than others and, if so, variations in the development standards should be provided for. Before this can be achieved however, additional detailed information on particular dune characteristics and their degree of sensitivity to development will need to be collected. In the meantime, there is a need to establish some minimum dune

development standards. The following evaluation of specific dune characteristics provides the basis for these standards.

Geographic Scope of the Regulation

The sand dunes which are the focus of the following discussion are dunes within Michigan which lie adjacent to the Great Lakes. They include all "*barrier dunes*" which are designated pursuant to Public Act 222 of 1976, the Sand Dune Protection and Management Act, MCL 281.651 - 281.664, as well as any other dunes locally designated.

Dunes designated as *barrier dunes* under PA 222 are a subset of lands subject to regulation under that act. Barrier dunes are predominantly those contiguous dune areas that are composed primarily of sand and exhibit the greatest natural relief compared to adjoining lands. In some areas, barrier dunes extend inland as far as a mile. More common however, is an inland depth about one-quarter to one-half mile. In some areas, barrier dunes are mere ribbons of land along the shore.

Since there are pockets of sand dunes along the Michigan Great Lakes shoreline that are not designated under PA 222 of 1976, and there are other locally significant dunes within designated areas but outside of barrier dunes, it is important to recognize that the analysis which follows could apply just as aptly to these locally significant sand dunes as to dunes designated under PA 222. Communities that do identify and designate locally significant sand dunes for both planning and regulatory purposes, will want to think of these dune lands as "*dunes subject to regulation*" (DSR's), a term which includes dunes designated under either the state program or a local program, or both.

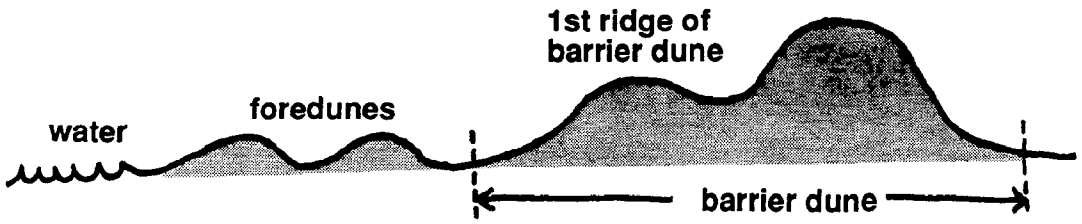
Within an area designated under PA 222 of 1976 are likely to be a number of different types of sand dunes, as well as areas of sand without any remaining significant relief relative to adjoining lands. As a result, the sample development regulations presented in Chapter Four distinguish between *foredunes*, the *first barrier dune ridge*, the *barrier dune* itself, the *beach* and other sandy areas (such as sand plains and plateaus). These basic terms are illustrated in Figures 2, 3 and 4.

Figure 2 illustrates a cross section of a barrier dune within a designated sand dune area. Sand dunes of local significance could likewise be identified and mapped in a similar fashion. Figure 3 illustrates a perspective view of a foredune and parabolic back dunes and clearly shows the landward extent of the barrier dune. Figure 4 shows an area designated under PA 222 of 1976 as well as the inland extent of a barrier dune within it.

FIGURE 2

BARRIER DUNE

CROSS-SECTION



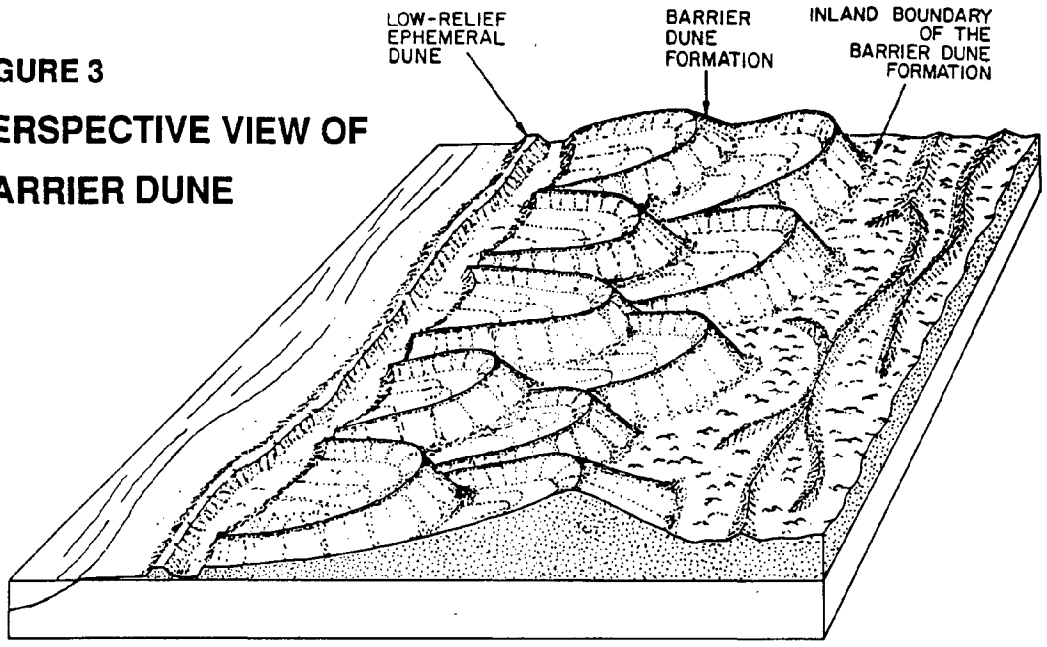


FIGURE 3

PERSPECTIVE VIEW OF BARRIER DUNE

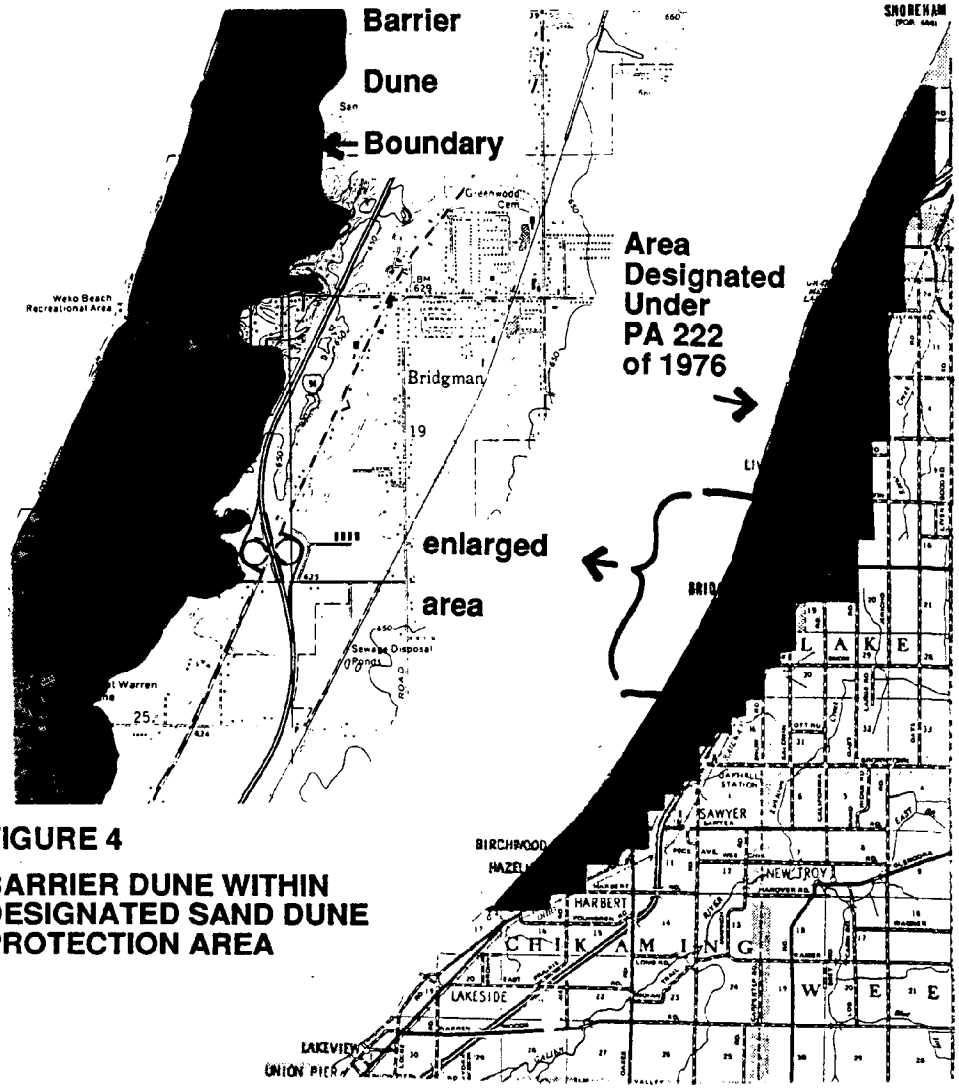


FIGURE 4

BARRIER DUNE WITHIN DESIGNATED SAND DUNE PROTECTION AREA

Three Basic Characteristics of Development

Three characteristics of development are of special significance when preparing zoning regulations. These are land use, density and a variety of siting considerations. Normally land use is the first issue addressed in a planning study examining the appropriate use of a particular area. The actual land use choice will be significantly affected by lot width, lot area and setback requirements. These restrictions and the high land value of waterfront property will probably further limit the type of new land uses in sand dunes. Consequently, the actual use of the land, provided the intensity of use is not too great, becomes a somewhat less significant factor than in most land use studies. These practical considerations also further support the use of an overlay zone in sand dune areas because an overlay zone does not disturb the local zoning pattern. On the other hand, density/intensity of use is a very significant factor because dunes are a fragile environment. It is important that development density and intensity of use be limited in order to protect native vegetation, surface area coverage and access. A large minimum lot size requirement is an effective way to address this issue on undivided lands. Likewise, very careful siting of new structures and access on the lot will further insure that the natural dune environment is subject to the least amount of disturbance. The following discussion examines these factors in more detail and provides important background material for the sample dune zoning regulations in the following chapter.

Land Use

The land uses which are attracted to a sand dune location are many and range from the most common -- single family homes/cottages -- to recreational uses such as camping and off-road vehicle use, to industrial activities like nuclear power plants. Each could be seriously harmful to the natural dune environment if poorly sited and used, or subject to significant threat of damage from natural forces. Protective sand dune standards used in conjunction with site plan review will have the effect of limiting most nonresidential and nonrecreational land uses from establishment on a sand dune -- if the high costs for dune development do not already achieve that. As a result, an overlay zone technique is probably adequate to achieve the desired protection in most communities, since the actual use is often not as critical as the intensity and frequency of activity in the dune. This may not be true where an intensive use generates a large volume of wastewater that is handled by an on-site septic system (as opposed to a municipal treatment system). In such a case additional controls will be necessary.

Some land uses are by their very nature, dependent on a lakeshore location. These include some power plants, marinas, certain types of boat manufacturing, beach recreation, port facilities and others. As a result, it is important to specifically provide for *water dependent* land uses and recognize that ***where no other locations are feasible***, it may be necessary to site one or more of these in sand dunes as opposed to other shoreline areas. In so doing, typical setback and use limitations will have to be modified. However, intensive water dependent facilities such as power plants should still be sited as far inland as possible, and the waterfront should only support limited structures such as water intake lines, outfalls and pumping facilities. These may even be unnecessary in an observable surface location. Power plants built on the Great Lakes in the last twenty years have generally not adequately located principal structures sufficiently away from the waterfront from

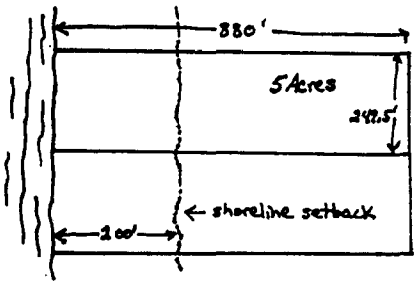
the standpoint of their impact on the dune environment and their visual impact on surrounding lands.

The more rural the location, the more likely the primary land use will be single-family residences. Provided lot sizes are large, access is controlled, and siting standards are met, there appears to be no reason that single-family uses cannot be permitted in most dune areas.

The only totally dune destructive land uses are consumptive, like mining, and off-road vehicle use. The former actually physically removes the dunes, the latter destroys any native vegetation, exposing the soil to the strong forces of wind and water erosion, thereby destroying the dune resource over time.

Density and Lot Width

Density of development is generally a critical factor in determining the intensity of use of a parcel. This is also true in sand dune areas. The most basic measure of density for residential land uses is the number of dwelling units/acre or square feet/land area. In stable sand dune areas without unique plant/animal communities, a density greater than one unit per five acres can lead to substantial use and hence destruction of the dune. In more unique dune environments, or in very active dunes, development at densities below 1 dwelling unit/5 acres may be necessary to prevent significant destruction. The same standard would also apply to multifamily development. In other words, a 12 unit garden apartment would require a lot of sixty acres to have no greater cumulative impact on a dune.

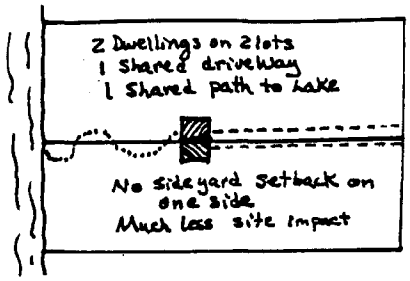


However, it is not merely the overall density of development that is important. In waterfront locations, lot width is an equally significant factor. Due to the desirability of location on the lakeshore, narrow lots are common. However, the narrower the lots, the greater the number of dwelling units fronting on the shore, and hence the greater the number of persons who have direct access to the water. This results in greater use and impact on the dune resource. Narrow lots also necessitate many separate and long access drives which further impact the dune. This impact can be lessened by prohibiting lots below a certain width, such as 245-330 feet. The actual minimum lot size and width standards should be determined within each community based on the specific characteristics of the dunes in that community and consistent with state established parameters. The availability of public sewer and water may permit a slightly smaller lot size in some dune locations. For example, if the community already has undeveloped platted lots, and if public water and sewer service is already available, and if the dune lands in question exhibit no particularly unique characteristics, then a small lot width may be appropriate. However, in this instance, shared access drives and shared beach paths may be necessary to minimize dune impacts.

The total amount of nonimpervious surface per lot area is also a way to measure density. This is an especially appropriate measure to use for nonresidential development. Minimums are harder to establish for nonresidential development, but if correlated with single-family uses they would begin at about 2,000 square feet per 5 acres.

It may be desirable to provide an incentive for a design which minimizes impact on the dune. One of the best incentives would be a higher density. A higher density permits a developer to spread his development costs across a

higher number of dwelling units, and hence lowers the per unit costs, while generally also increasing profits. With regard to single family development, a more environmentally sensitive form of development involves **shared lot access**. This involves two adjoining lots using a single drive for access and a single beach path. It also permits duplex style development and its lower cost, shared wall construction form. Where such development is proposed, and it would not result in additional negative dune impact, it should be permitted with a density bonus in the form of a lowered minimum lot area. A reduction from 5 acres to 4 for a single family house would probably be appropriate given the additional amount of undisturbed dune that is protected by not having to construct an additional access drive.

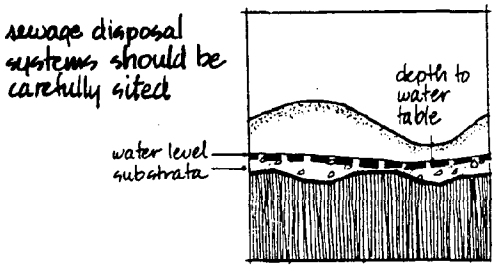


As noted earlier, in particularly sensitive dune areas, or to achieve greater protection, a larger minimum lot size and width will be necessary. Actual density standards that are sensitive to the dune environment, to existing land uses in the area, and to the existing investment in public infrastructure, could only be established based on a detailed local dune study. While such studies need to be undertaken, to delay development of any protection measures until such studies were done would only insure more destruction occurs. As a result the sample ordinance language in the following chapter may need to be modified to meet local needs, but should serve as a starting point, or an interim measure, until more detailed local studies could be performed.

Water Supply/Wastewater Disposal/Groundwater Contamination

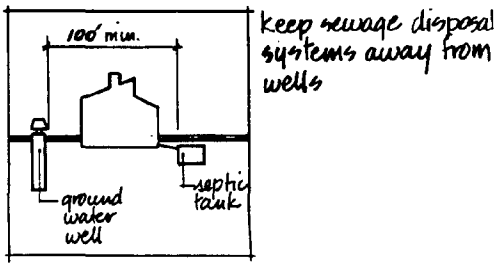
Sand dune development poses a couple of unusual problems with regard to water supply and wastewater disposal. The main problem is the threat of groundwater contamination from use of septic systems. Since fluids percolate through sand so quickly, contaminants flow easily through the soil to groundwater supplies. As a result, it is easy for a septic tank to contaminate the water well of the same family. Even when municipal systems are used, leakproof in-ground connections are critical.

Another problem is the threat of wastewater undermining the dune face. Clay lenses or other variations in the dune morphology may result in wastewater flows which cause dune slumping, jeopardizing the stability of any structures thereon.



Principal regulatory considerations include: requiring local public health department approval where municipal water and wastewater systems are not available; requiring structural setbacks for wells and septic systems at least as far landward as the principal structure; and requiring special protections when a structure is erected on a steep slope (12-25%) or over known unprotected acquifers. Construction on stilts, or the use of holding tanks may be necessary in some situations.

The Michigan Public Health Department now recommends a minimum of 100 feet setback for a septic tank from any water body and an equal separation distance between a well and septic tank if sandy soils are involved. However, these recommended standards may not be formally adopted or applied by all local public health departments. Additionally, many of the local zoning regulations cited previously have even greater minimum setbacks for septic systems and wells. The primary reason for these setbacks is because of the severe threat of shoreline erosion, and the possible undermining of the dune. Of course, water pollution is also a concern. Many, but not all, local health



departments appear to be willing to uphold these stiffer local zoning requirements. If sand dune development legislation is adopted, it would be best to specifically provide for more restrictive local regulations over well and septic tank location in sand dune areas.

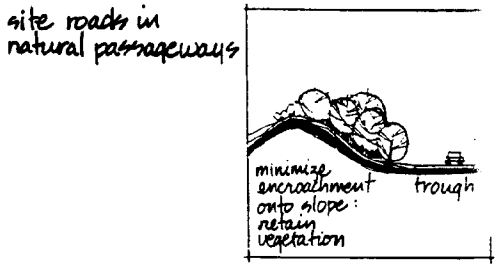
Access

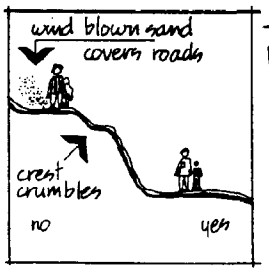
The two principal considerations with access focus on the motor vehicle and the pedestrian. There are two major motor vehicle concerns. The first relates to controlled access, the second to uncontrolled, or in this case, to off-road vehicle (ORV) use. In stable, vegetated dune environments off-road vehicle use is very destructive. However, where access is controlled by means of a road which follows the natural topography without breaching the dune crest and exposing it to erosion, the amount of damage can be significantly reduced. Covering the access drive with a semi-permeable surface and then planting hardy dune vegetation along the road to a distance about fifty feet on either side will further reduce the damage. No motor vehicle access should be permitted lakeward of the shoreline setback line. (See below) Within barrier dunes, ORV use should be limited to state designated areas and to the approved access road leading to the principal structure on a property.

Pedestrian access needs to be rigorously controlled across the dune to the shore. One effective means is by use of a raised wooden walkway and stairs, especially where a dune crest and windward side must be breached. Stairways need to be carefully designed to achieve their access purpose without interfering with the natural shoreline appearance. Joint use of a single set of stairs by several property owners should be encouraged. Signs and careful design are often necessary to channel pedestrians onto the dune walkways, but they can significantly reduce impact. Generally these paths should follow the low relief topography to the shore in order to minimize impacts.

Setbacks

Setbacks are a common tool for minimizing the impact of development by establishing an area of open space around permitted structures and uses. In changing natural environments, like sand dunes however, establishing the setback becomes difficult because of the lack of specifity of the beginning point of measure. Unlike a lot line which can be established precisely with the proper surveying tools, and which generally runs in nearly straight lines, the water's edge, ordinary high water mark, 100 year floodplain line, beach, foredune, and crest of the first barrier dune ridge, all have shapes that are never straight and the latter three are continually in flux. Yet each is a possible point from which to measure a setback. Despite these problems, ***insuring that structures are set back an adequate distance from the shoreline is probably the single most effective way to protect both a landowners investment from the hazards of the near shore, and the shoreline dune environment from the destructive consequences of intensive use. This setback is called a shoreline setback.***





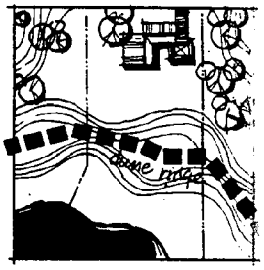
Measuring from the water's edge or the ordinary high water mark is difficult due to lake level fluctuations (especially over a 20-30 year period). It could result in a widely variable setback over time, and poses some equal protection problems. Where a 100 year floodplain line has been established, it is also an ascertainable measuring point, however, much of the shoreline has not had a floodplain line established, and old lines were not based on long periods of high lake levels which exist at the present. As a result, the water's

edge, ordinary high water mark and 100 year floodplain lines are not adequate points from which to measure shoreline setbacks. Instead, the point of measure must originate from the dune itself.

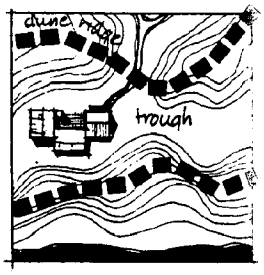
There are at least four different general types of dune assemblages to accommodate with a shoreline setback. They are illustrated in Figure 5. The first involves a foredune and low sand dune area that extend more than 200 feet landward from the foredune. The *foredune* is the first dune immediately inland of the beach and parallel to the shoreline. Foredunes are relatively low, seldom attaining a height of more than 30 feet. The windward face is often gently sloping; it may be vegetated with dune grasses and low shrub egetation, or may have an exposed sand face. In these instances, which are somewhat common, measuring from the crest of the foredune is the preferred place to measure from as the foredune establishes a common and important berm against wave and ice action. Additionally, to a trained observer it is readily identifiable, although somewhat dynamic (especially in strong storms and during periods of high water). A setback of 200 feet landward from the crest of the foredune is probably necessary to minimize the area exposed to erosion from the strong nearshore winds, and to minimize the visual impact of development on the dune.

The second situation involves a larger dune that rises much higher than the foredunes and lays within 200 feet landward of the first foredune. In this case, a 200 feet shoreline setback may fall on the open face of the larger dune or below the crest. No development should be permitted on the face of the larger dune, due to a combination of factors which create risks to development as well as to the dune (including the danger of slumping, especially on steep slopes, and removal of protective vegetation) and because of the aesthetic intrusion it creates on the dune landscape as viewed from the lake or shore. In these situations, which are common, the shoreline setback should be at least an additional fifty feet back from the crest of the barrier dune ridge. This will help insure a stable location for the structure, and prevent it from domineering the landscape. In most cases, this situation will occur on the *first barrier dune ridge.* The *first barrier dune ridge* is the first geomorphic sand dune feature that displays the greatest relative relief as viewed from the lake. *Barrier dunes* represent those dunes designated as such under PA 222 of 1976, as well as any locally designated "barrier" dunes.

home sited on back of lot, away from lake and foredune ridge



residential development located in trough; road sited in natural swale

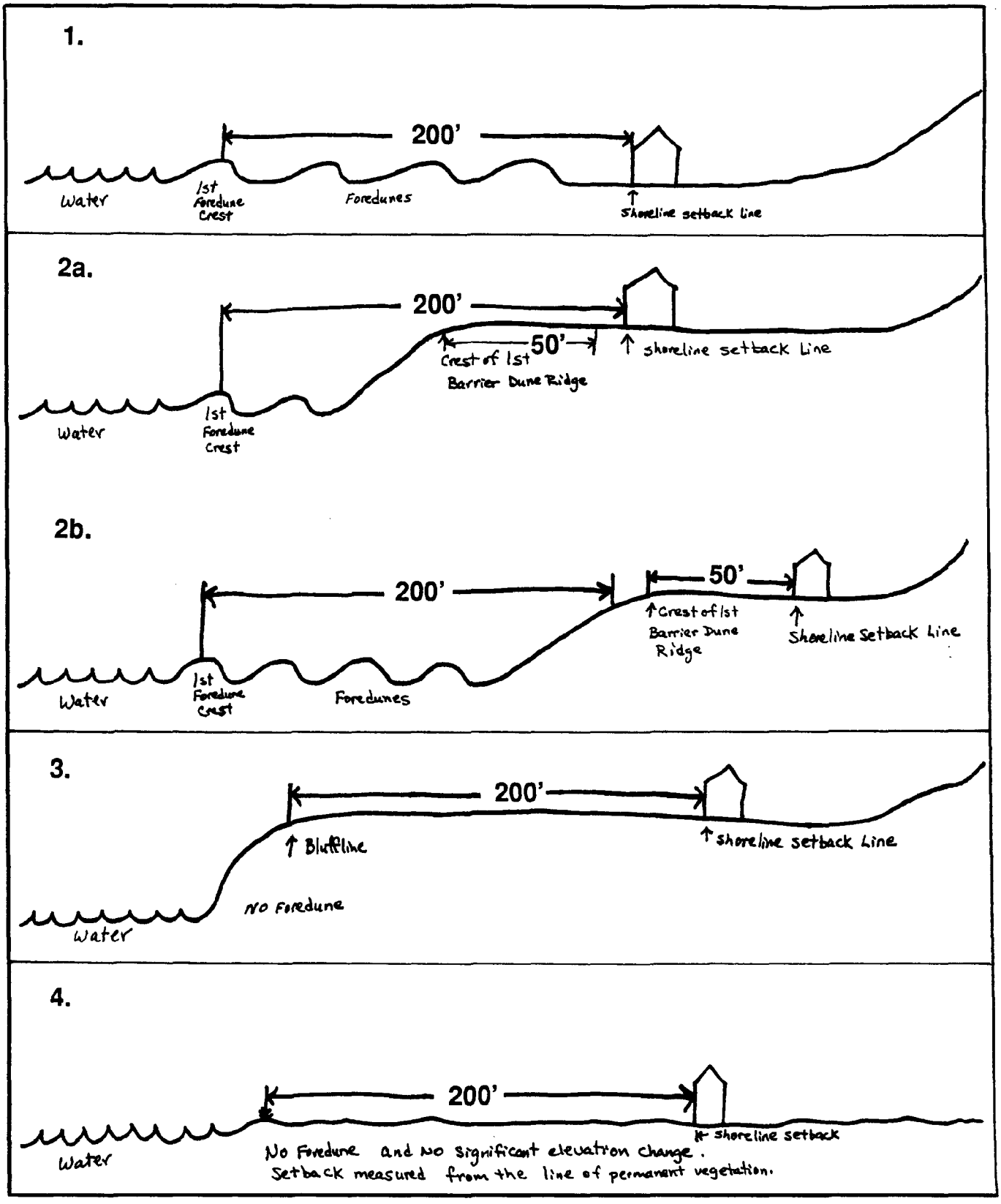


The third situation is where a sand dune rises steeply from the shore, without a foredune. Since erosion at the toe of the bluff makes slumping likely, especially when lake levels are high, and a point of measure shoreward of the bluff is unlikely to give ample protection from the erosive forces of water, the crest of the dune or bluffline becomes the essential point from which to measure a setback for properties identified as at risk of erosion under the Shorelands Protection and Management Act, PA 245 of 1970. However, sand dunes have characteristics different from other shoreline properties and setbacks greater than those established under PA 245 are necessary in most situations. With sand dunes, protection from wave erosion is only one of the public purposes sought to be achieved. Also important is minimizing removal of dune vegetation, minimization of future erosion potential and protection of a natural appearing shoreline. A setback of at least 200 feet from the first ridge of the barrier dune may be necessary in order to achieve these purposes. Where a greater setback under PA 245 is established, it should of course supersede.

Figure 5

SHORELINE SETBACKS FOR FOUR TYPES OF DUNE ASSEMBLEGES

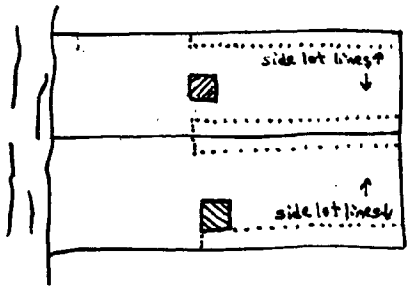
- Structures are Permitted Landward of the Shoreline Setback -



The fourth situation is uncommon. This is where there is no foredune and no significant changes in elevation. What is present is a nearly flat sand plain. In this case the setback should be at least 200 feet, and probably further from an aesthetic point of view. It would be measured from the first line of permanent vegetation.

In any event, where a setback established by the DNR in a designated High Risk Erosion Area (HREA) under the Shorelands Protection & Management Act, PA 245 of 1970 is greater than a setback established for sand dunes management, the greater HREA setbacks shall apply.

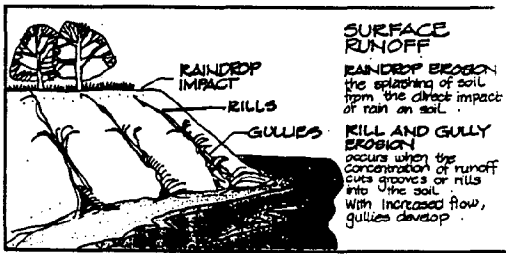
Setbacks from side lot lines and from the lot line opposite the water (which provides access to the lot) are also important. On lots with wide minimums a sideyard setback of 25 feet would be adequate. Front yard setbacks commonly range from 35' to 50'. As used here, "*front yard*" refers to the normal definition designed to protect open space from the vehicular lot access point, not from the water's edge. Of course, a deeper lot will often permit future options for moving an endangered structure back and may be translatable into a preferred lot size in a sand dune area. If so, care must be taken to assure an adequate front yard setback remains. A greater side lot setback may be desirable to maintain the open space character of the dune zone and should be instituted by local governments so inclined. No side lot lines should be required on the side where two single family dwellings are built side by side and utilize a single shared access drive as was previously described in the density section.

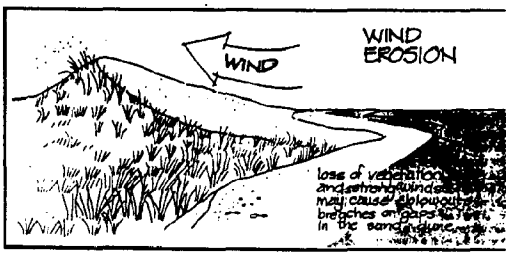


Erosion/Filling/Grading/Slope

The greatest threat to the natural dune environment begins with destruction of the vegetative cover. This permits the wind to blow sand particles off the dune and create a blowout. As it grows, the blowout undermines vegetation at the edges and eventually can result in a large open area of unstable, blowing sand. The same effect can be created more quickly with grading, filling or sand removal. As a result, these activities need to be strictly limited in order to protect the dune.

This can be achieved by: limiting the area that may be graded, built upon, or excavated; by requiring quick revegetation of exposed areas; and by requiring that all earth moving activities be accomplished in accord with an approved site plan and soil erosion control plan. No such activities could be initiated prior to attaining these permits. It may be necessary to allow some grading up to a certain sized area for the principal structure, parking, septic field and access road. This should be provided for and regulated by site plan review.



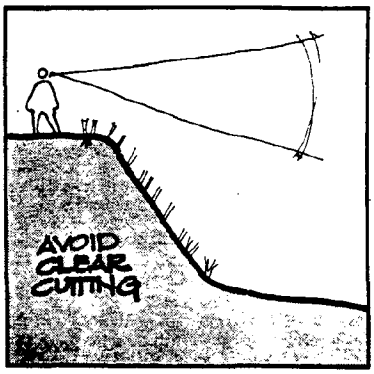


The degree of slope of the sand upon which structures are proposed to be erected also greatly increases the risk of hazard since sand is unconsolidated soil which flows easily and, without side and bottom support, is tough to compact. Dune slumping is common during periods of high water, after storms, and sometimes after heavy rains. In areas at high risk of erosion (especially during periods of high lake levels), the threat is especially severe. As a result, restrictions on slopes of more than 12% are necessary, and construction on slopes above 25% should probably be prohibited. In addition, special foundation requirements and stilt construction may be necessary. Such regulations

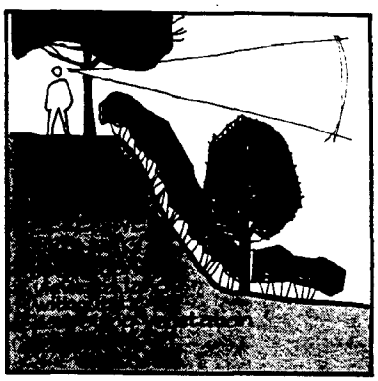
are not unlike those commonly found in other inland areas with steep slopes or those with different kinds of unstable soils.

Vegetation

In addition to the role that vegetation plays in stabilizing sand dunes, another important consideration is development impact on unique plant communities. Sand dunes support a wide variety of plant life, some of which is unique to the state. Occasionally, this vegetation occurs in a diversity that includes several unique plant communities. The state's most rare and/or exemplary plant communities should be protected through public or nonprofit ownership and management. On private properties, unique plant species and communities should be identified and steps initiated to minimize development impact upon them. The site plan review process would be the appropriate place to insure these measures are taken.

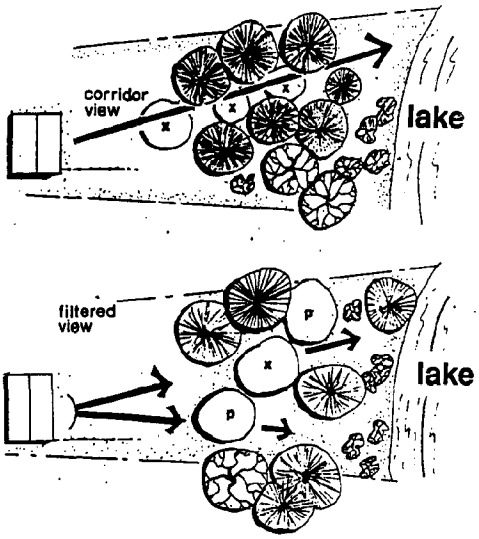


In the more common situation, merely limiting removal of more vegetation than is minimally necessary for a building site and access accomplishes most of the objectives associated with retention of native plants. However, the strong desire to build on lots "*with a view*" raises another issue, removal of vegetation for the purpose of getting a clearer view of the lake. Of course, unnecessary removal of vegetation increases the risk of serious erosion, allows nutrients often introduced to feed attempts to grow lawn type grasses to percolate into the soil or water, and creates circumstances leading to eventual soil instability. Additionally, extensive "clear cutting" of vegetation often exposes development to viewing by vessels on the lake and pedestrians on the waterfront thereby reducing their enjoyment of a shoreline with a natural appearance. A shoreline that appears natural enhances the recreational experience of the viewer and hence its value as a tourist/recreational activity. Since the primary economic base of most shoreline communities is tourism, the local economy is enhanced by controls which protect a natural shoreline appearance. As a result, while some tree trimming could be authorized, it should be severely limited.



Additionally, all areas where vegetation is removed but no structure is erected should be required to be revegetated with native plants, notably dune grass, within a short period of time. This will help stabilize the sand and prevent erosion.

In heavily forested dunes with merchantable timber, it may be necessary to permit selective cutting of a larger area, but not clear cutting. This should be accomplished by standards which require zoning approval of a cutting plan prepared by a professional forester, and which still maintains a lakeside buffer of trees to a depth of at least 100 feet, so that the view from the shoreline remains natural.

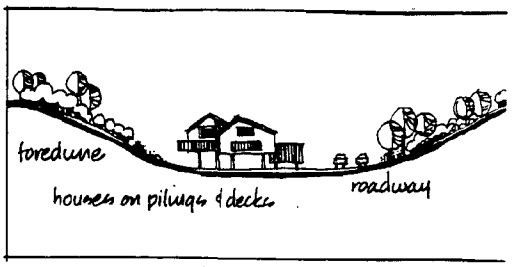


Design/Siting

There are two major factors that have special significance in the siting of a structure in a sand dune: layout and aesthetics. Careful site layout can go a long way to minimizing the negative effects of development on sand dunes. Previous paragraphs have presented various ways in which this can happen.

Aesthetic considerations however, are a little harder to accommodate, but no less important in achieving the preservation of a natural shoreline appearance. Scale, height of structures, affect on existing vistas, and slope are criti-

cal aesthetic factors. In the context of this report, scale refers to the bulk coverage and proportions of structural development as it is viewed from the beach or water. When a project appears too large or out of scale with its surroundings, then it attracts attention at the expense of the larger panorama. When the natural beauty of the Michigan shoreline is at issue, to be out of scale is a serious visual offense. One related attribute is the height of structures. Where structures are higher than the surrounding vegetation, they stick out and again interfere with the beauty of the natural shoreline. Structures in sand dunes should be limited in height to the on shore horizon, or not more than 35 feet, whichever is lower.



place houses back from foredune up on structures when the possibility of dune movement exists; place roads even further back.

If scale and height are controlled, then in most cases, development will not improperly interfere with the shoreline panorama. However, in those areas where public access to the dunes affords an especially beautiful coastal vista, such as at one of the many state and local parks, then development should be even more carefully scrutinized for its impact on the shoreline scene.

THIS ↗

NOT THIS ↘

Prohibiting construction on the lakeward face of the first tier of dunes would also significantly serve to protect scenic values and prevent destabilization of protective vegetation. The exposed face of most of these dunes is easily visible from many vantage points and represents perhaps the most obvious visual attribute of the dune. The limitations on building significant structures on steep slopes described above, already reduce the likelihood of such construction, but a prohibition for scenic reasons alone, may not be out of order in this situation. However, a number of accessory structures such as stairways, decks, satellite antennas, and elevators are not uncommon. Their presence can seriously disrupt the natural beauty of the shoreline, even while preventing further dune destruction by controlling shoreline access. As a result, such accessory structures need to be carefully reviewed to insure they are properly sited to prevent visual blight while also protecting the dune from erosion.

Natural building materials and earth tones should be used to reduce the impact of the visual image created by development in sand dunes. Properly utilized, earth tones and the use of building materials indigenous to the area will help insure that a structure does not *stand out* from the natural dune environment and thereby interfere with the natural scene.

Shore Protection Devices

Owners of property facing severe threat of erosion often wish to erect shore protection devices in order to protect existing investments. However, few structural solutions to the erosive forces of water provide the kind of protection usually desired, and those that do are often high in cost, and may cause unintended consequences on adjacent properties. As a result, many states and localities have begun to focus on nonstructural (usually regulatory) solutions over structural solutions. Yet, existing state and federal laws permit the establishment of certain approved shore protection devices and local zoning regulations need to accommodate them.

To insure that protected public trust interests are not violated, permits from the Michigan Department of Natural Resources and Army Corps of Engineers are necessary before shore protection devices may be constructed. Zoning regulations should require that such permits be obtained and condition approvals upon them. Additionally, local zoning ordinances need to anticipate where shore protection devices (accessory structures) are installed, what

types and materials are used, and the nature of access and equipment that may be necessary. While a specific development proposal may not originally include shore protection devices, they may be proposed later. By anticipating this possibility, standards for access can be developed to insure that unnecessary damage to dunes is not created by the establishment, repair or maintenance of shore protection devices. If possible, incentives should be provided to encourage a joint (multi-landowner) solution to shoreline erosion, perhaps at the time of subdivision approval. Because of the complexity of the issues presented here, local sand dune management plans should address this issue in more detail. Input from the DNR and Army Corps of Engineers should be sought.

Other Accessory Structures

A variety of other accessory structures may be proposed for construction on lakefront property. Nonpermanent structures such as movable gazebos, swingsets, picnic tables, etc. should be permitted as long as they are required to be removed when serious threats to their existence are in evidence. Accessory structures with permanent foundations such as garages, other storage structures, flagpoles and the like should be set back with the principal structure for the same reasons. Waterfront accessory structures such as docks, piers, and boathouses should be regulated per existing state and federal laws. However, care should be taken to insure that such structures do not interfere with coastal and adjacent property owners views of the shoreline. Shoreline access structures, such as boardwalks, stairways, and structures designed to minimize erosion, such as snow fences, should be permitted as long as they do not unreasonably interfere with the scenic values of the area. Again, use of natural materials is important.

Parking and Loading

Parking of motor vehicles should be maintained behind the shoreline setback line according to standards generally applicable to parking in the ordinance. Aside from screening, placement in a stable location, and a design that minimizes erosion, no additional special regulations should be necessary. Most of these objectives can be achieved by site plan review, provided adequate standards are already in the ordinance.

Signs

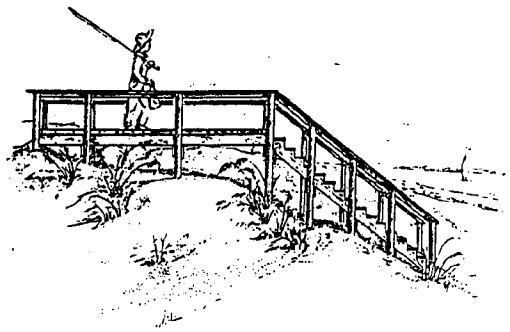
Like parking, signs are usually managed by a single set of regulations that apply to all districts. The only special sign provisions in sand dunes relate to prohibition of signs (structures) permanently mounted lakeward of the shoreline setback. This is due to the hazards associated therewith, and to minimize visual pollution from the shore. Exceptions should be permitted for small signs made of natural materials advising pedestrians to stay on designated pathways, or to post property against trespassing.

Special Considerations

Several other aspects of zoning to protect sand dunes warrant consideration. These include: how to treat existing nonconforming lots of record and future requests for redevelopment of those sites; how to handle variance requests and appeals; and how to handle "second tier development" which may attempt to channel access for backlot owners across the dune.

Undeveloped nonconforming lots of record pose the greatest administrative difficulty for protection of sand dunes. Often these lots are very small, on par

with old urban lots, and may have already eroded significantly. They are often long and narrow and in an area with many other lots of a similar size. In some cases no structural use of the lot is feasible that is not in imminent hazard of destruction. In other cases some temporary structural use may be feasible, such as allowing a movable structure, like a mobile home, to be established on the site. Unfortunately, where the lots are shallow and narrow, the opportunity to screen structures from view is greatly reduced. Nevertheless, as much vegetative screening as is feasible should still be imposed, especially when the area in question is within the view of a major public shoreline facility, such as a state park. Additionally, where adjoining nonconforming lots are in single ownership and combining them would reduce the extent of the nonconformity, the owner should be required to combine them for purposes of use. The model zoning provisions prepared by the DNR to implement the high risk provisions of the Shorelands Protection and Management Act provide an instructive model for dealing with these problem lots. Where no reasonable use of these lots remain, it may be necessary for the public to purchase them. Existing developed lots that become nonconforming as a result of these regulations pose a different problem. In cases where structural changes are proposed, regulatory procedures need to seek conformance with the spirit of the regulations if the particular requirements cannot be met.

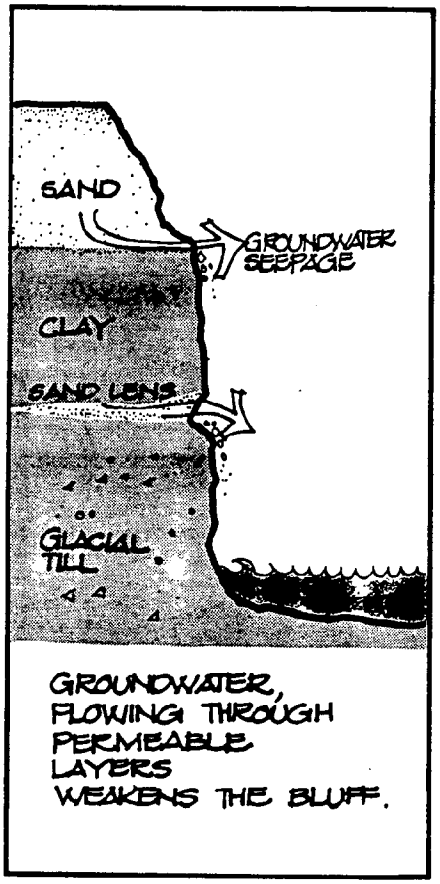


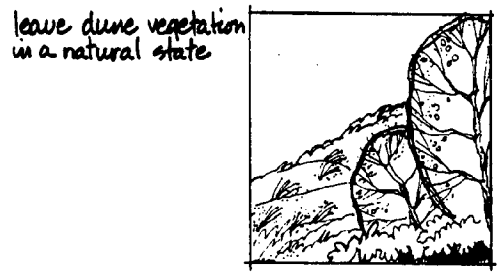
Variances will inevitably be requested, and in some cases needed, hence clear variance standards need to be an integral part of the zoning ordinance. This is most common where a lot is nonconforming by virtue of its being established prior to the effective date of the ordinance, or becomes nonconforming because of natural erosion processes. In other instances the unique characteristics of the property when coupled with development regulations may be unduly harsh and threaten to permit no reasonable use of the property. In these instances a variance is necessary to prevent a regulatory taking of property. Again, the model zoning standards prepared previously for zoning of areas subject to high risk of erosion are instructive.

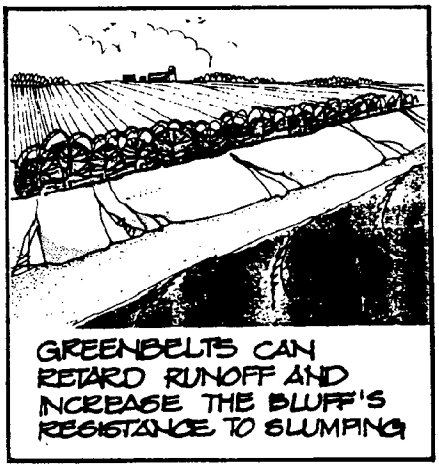
Redevelopment of existing lots to (generally) a more intensive use, whether or not the lot is nonconforming, is very likely going to be a common form of desired shoreline development in the future, since the availability of shoreline property is a fixed commodity and demand continues to rise. The resulting pressure and rise in value will create economic conditions favorable to redevelopment. Some redevelopment will simply be replacement of single structures (such as those threatened by erosion) with a new structure; other redevelopment will be consolidation of several lots under single ownership for construction of multiple dwelling units or a nonresidential development. This sort of redevelopment provides the greatest opportunity for a design that minimizes impact to sand dunes, especially if regulated by PUD or clustering provisions.

Second tier development poses a more difficult problem. As demand for shoreline development continues to grow, eventually requests for keyholing will be made. Keyholing refers to the funneling of people into an area, in this case onto sand dunes and a beach, through a waterfront lot that connects to a backlot. If the backlot is large, and intensively developed, then a large number of people could gain shoreline access, conceivably through a narrow shoreline lot. This type of development could spawn problems of trespass on adjoining beaches and may result in damage to the dune over which access is gained. One popular regulatory technique that has not as yet been success-

fully upheld in state courts, involves limiting the number of dwelling units and hence the number of people who are permitted access to a shore via a lot with a specified minimum width. If the lot width were large, it would effectively prohibit the establishment of a keyhole lot. However, since there is no specifically authorized legislative standard for shoreline lot widths, it is up to the community to establish a standard that is reasonable. In sand dune areas this is difficult to do, as a reasonable standard will vary depending on the size (and hence capacity) of the beach. Since the size of the beach is often a factor of the height of the lake level (when water is high the beach is small, when water is low the beach is large), the determination would have to be made based on historical information unique to a specific site over a long period of time, or be based on a fixed standard applied uniformly to all lakefront lots. The complexity of issues related to keyhole development suggest that considerable additional study and quite possibly a legislative remedy is needed.







Chapter Four

SAMPLE ZONING ORDINANCE

This Chapter presents the text of sample zoning language that could be adopted by a shoreline community to control development in sand dunes.

Key elements of the sample ordinance are listed below:

- the ordinance is designed as an overlay to existing zones to minimize disruption of the current zoning plan, this preserves most of the uses permitted in the underlying zone although new lot sizes apply;
- the geographic area covered by the overlay zone is the same area designated as barrier dunes by the DNR, plus any areas locally designated;
- sand dunes are declared to be a natural resource protected under the Michigan Environmental Protection Act, PA 127 of 1970;
- all development is required to go through site plan review, including any significant alteration to existing lots or structures, and any new single family homes;
- whenever four or more dwelling units or whenever 3,500 square feet or more of land will be disturbed for construction and/or paving the project must be processed via planned unit development provisions, (only the site plan review requirements for such PUD's are detailed in the sample ordinance);
- a detailed site investigation report must be prepared for all development involving four or more dwelling units or more than 3,500 square feet of surface area; for all PUD's and for all water dependent land uses.
- a minimum lot size of 5 acres is established for single family residences;
- nonresidential development requires a 5 acre minimum lot size plus 1 acre for each additional 1,000 square feet over 2,000 square feet;
- a minimum lot width of 245 feet;
- all development must be landward of the shoreline setback, except for variances on nonconforming lots;
- the shoreline setback line is the line which is the furthest inland of the following -- 200 feet landward from the crest of the foredune or when there is no foredune from the first line of permanent vegetation; 50 feet landward from the crest of the first barrier dune ridge if that is at least 200 feet inland; or the high risk erosion area setback. A procedure for waiving up to 30% of this setback is established for use in certain unique circumstances;
- septic systems and wells must be set back at or landward of the shoreline setback;
- a few water dependent land uses such as shore protection devices are permitted to locate shoreward of the shoreline setback;
- there are threshold limits based on project size and type for data submittal requirements and for the degree of scrutiny placed on development requests: small projects have less data and a less detailed review process than large projects;
- a soil erosion and sedimentation control permit is required for all development;
- development on steep slopes is greatly limited;

- disruption of native vegetation, the method of obtaining access, and the visual effect of the development as viewed from the beach and water are all regulated with discretionary standards to permit latitude in the achievement of desired public purposes. Vegetation can be trimmed for a view, but most of the shore cover must be retained.

Instructions For Use of Overlay Zone

Section numbers should be changed to fit into the structure of the local zoning ordinance. Sections 16.000 - 21.000 (dealing with nonconforming uses, variances, movable structures, appeals, conditions, and hold harmless provisions) may already be adequately embodied in the local zoning ordinance and may thus be unnecessary or may need only slight modification. Section 7.040 (site investigation report) would be unnecessary if no intensive land use is permitted. The ordinance assumes there are already detailed site plan review and planned unit development (PUD) provisions in the ordinance. It not, such provisions would need to be added to fully implement these sample provisions. The proper references to these sections of the existing ordinance will have to be added as necessary.

Words underlined should have the appropriate city, village, township, county or lake inserted. The term "Zoning Administrator" is used throughout to represent the responsible administrative official, if a different official is to be so designated, this term will need to be changed throughout the Article. Words in *italics* are notes that should be replaced prior to adoption with appropriate alternative language. The definitions in Section 22.000 should be added to the appropriate section of the local ordinance.

If the community desires to apply the following sample regulations to sand dune areas not designated as such under the Sand Dune Protection and Management Act, PA 222 of 1976, it will be necessary to do a few other things first and then to make a couple of additional changes in the following sample regulations. First, sand dune areas of local significance will need to be identified and mapped. At a minimum they should be included in the local comprehensive or master plan, or a special planning report, and included on the zoning map or a special overlay to it for sand dune areas. Secondly, the term "*dunes subject to regulation*" or *DSR*, should be used in several key sections of the ordinance. This will indicate first, that not only dunes designated under PA 222 are subject to regulation and secondly, if applicable, that not all other dunes are also subject to these regulations. The DSR designation should appear on the zoning map and as noted in the following sections of this sample ordinance.

It is essential that the overlay zone be mapped and incorporated as a part of the zoning map in order to use these sample provisions. The map should illustrate the inland extent of the barrier dune and any other dunes subject to regulation. See Figure 2.

Additionally, the sample ordinance refers to the issuance of zoning permits. If your community uses land use permits, or simply a checkoff of zoning compliance on a building permit, then whatever terminology for the method used will have to be substituted for the references to zoning permits in Section 7.010, 7.020, 13.030, and 15.010.

ARTICLE _____ DUNE OVERLAY ZONE

Section 1.000 PURPOSES

Section 1.010 In recognition of the unique natural resources of the Lake Michigan sand dunes, and the threat of destruction to these lands created by conversion of dune lands to more intensive use, there is created a Dune Overlay Zone. The objectives of the Zone include establishing appropriate limits for human activities in a lakeshore environment that is on the one hand, very sensitive to disruption and on the other is a hazardous and constantly changing environment which threatens the health and safety of persons occupying poorly sited structures and which generates high public costs for remedial and emergency measures when structures are poorly located in dune areas. Additionally, these regulations seek to insure that a variety of benefits afforded by sand dunes left in their natural state are insured. These include the ability of sand dunes to buffer inland structures and properties from the effects of severe storms, their role as part of a coastal sand-sharing system, and their economic benefits for recreational and tourist activities. The balance sought to be achieved by this Zone favors the environment in areas of especially unique natural resources, such as barrier dunes, and human activities in areas where water dependency and lack of alternative locations is established. In addition to insuring the basic integrity of these unique natural resources, while still permitting a reasonable use of private property, achieving the purposes of these regulations will also provide private landowners with a continuous dune environment that insures to the extent practicable the values sought to be protected by these regulations.

Section 1.020 The Dune Overlay Zone is created to achieve specific land management objectives, to avert specific land use problems, and to protect the public health, safety, and general welfare. The purposes of this Zone include:

1. to preserve the dune environment which is an unparalleled natural resource, which is constantly changing, and which is vitally linked to the economy of the state;

2. to minimize the economic hardships which individuals and this Township may face from unanticipated property loss due to severe wind erosion, ice or water damage;

3. to minimize the damage to vegetation which is critical to stabilizing sand dunes and bluffs from the effects of wind and water erosion;

4. to protect rare and sensitive plant communities and endangered plant and animal species;

5. to preserve the lakeward face of dunes in their natural state and to insure the stability of all lands within a barrier dune and any locally designated dunes subject to regulation;

6. to protect the natural beauty of the shore environment; and

7. to permit development only when it can be accomplished with a minimal affect on the natural dune environment as established by the standards of this ordinance; and

8. to provide for development of water dependent land uses when essential to meet a public need and when no other location is available.

Section 1.030 No use of land within the dune overlay zone shall be approved which is contrary to the purposes of this ordinance as evidenced in Section 1.000, and/or to the standards and requirements of this ordinance applying to development in the dune overlay zone.

Section 2.000 POLLUTION, IMPAIRMENT OR DESTRUCTION

Section 2.010 The dune resources of the Lake Michigan shoreline within this Township are hereby declared to be a natural resource protected under PA 127, the Environmental Protection Act of 1970. No land use shall be established in this Zone which is likely to pollute, impair or destroy the air, water or other natural shoreline resources, or the public trust therein and for which there is a feasible and prudent alternative.

Section 3.000 AREA AFFECTED

Section 3.010 The provisions of this Dune Overlay Zone apply to all lands so depicted on the map entitled _____ Zoning Map which is a part of this Ordinance. These lands include the entire area designated as barrier dunes by the Michigan Department of Natural Resources pursuant to PA 222 of 1976, the Sand Dunes Protection and Management Act and to such other lands as locally designated as barrier dunes. Lands locally identified as barrier dunes on the _____ Zoning Map, but which are not as yet designated under PA 222 of 1976, shall be subject to the same sand dune provisions in this ordinance as lands designated under PA 222 of 1976. Locally designated sand dunes together with dunes designated under PA 222 shall be known as Dunes Subject to Regulation or DSR for the purpose of this ordinance.

Section 3.020 This Overlay Zone establishes regulations which apply in addition to those of the underlying district. Where the provisions of this Zone conflict with those of the underlying district, the provisions of the Dune Overlay Zone shall supersede, unless specifically so indicated.

Section 4.000 LOTS AFFECTED

Section 4.010 After the effective date of this ordinance:

1. no lot shall be created, subdivided or otherwise established without sufficient width or depth to accommodate a principal structure, as established by the minimum standards of this Ordinance;

2. all new structures, and all structural alterations or relocations of existing structures shall be in accord with the requirements of this Ordinance.

Section 4.020 Any substandard lot of record, or substandard lot described in a land contract or deed executed or delivered prior to the effective date of this Ordinance shall only be used in accord with the provisions of Sections 16.000, 17.000 and 18.000 of this Ordinance.

Section 5.000 PERMITTED USES

Section 5.010 All uses permitted in the underlying district shall be allowed in the Dune Overlay Zone unless they are unable to conform with the additional

requirements of this Overlay Zone as applied to a particular parcel. Additionally,

1. No use characterized by the outdoor or underground storage of any liquid materials (except water, home heating oil, natural or bottled gas), whether they be hazardous or not, shall be permitted within this overlay zone.

2. No off-road vehicle use is permitted from the shoreline to the inland boundary of a barrier dune except as provided in Section 11.010.

3. Wherever four or more dwelling units will be constructed on a single parcel or more than 3,500 sq. ft. of land will be disturbed for construction of a structure and or paving, development shall be permitted only through PUD approval pursuant to the requirements of this Article and Section _____ (*the PUD section of the ordinance*).

Section 5.020 Water dependent land uses will be given special consideration when developed via the PUD provisions of this Ordinance. Any requirements of this Article, including setbacks, may be waived by the Planning Commission for a water dependent land use when the applicant demonstrates the following standards are met:

1. there is no other suitable location available;

2. the waiver of each standard is the minimum necessary to permit establishment of the water dependent land use;

3. the site plan adequately represents that all reasonable measures to mitigate impacts on the shore environment will be taken and that adequate performance guarantees are collected to insure this;

4. all other requirements of the underlying district have been met;

5. that the means of access to the site for construction and maintenance will be the route that is least destructive of the natural environment;

6. that all requirements and standards embodied in permits of other local, state and federal authorities have been met.

Section 5.030 Water dependent land uses shall include but not be limited to the following land uses:

1. power plants, water and wastewater treatment plants serving the general public;

2. marinas;

3. marine construction of deep draft boats;

4. public waterfront recreation facilities such as beach houses, ancillary concessions, and related parking lots;

5. such other uses as permitted by the Planning Commission upon a showing of water dependency according to the standards in Section 5.020, but not including any of the uses specified in Section 5.040.

Section 5.040 Water dependent land uses do not include any form of residential habitation, whether permanent or temporary (including homes, hotels, motels, campgrounds). Nor are other commercial (whether retail or wholesale), nor industrial uses permitted unless listed specifically above.

Section 6.000 ACCESSORY USES

Section 6.010 Water related accessory uses such as piers, shore protection devices, seawalls, revetments, groins, boat shelters not larger than 200 square feet and no larger than 10 feet in height, and pumphouses may be authorized by the issuance of a special land use permit from the Planning Commission, provided that the following standards are met:

1. all necessary local, state and federal permits are obtained.

2. materials used are of a design, texture and color so as to not detract from the natural beauty of the shoreline and the structures are not used for human or animal habitation. The use of earth tones indigenous to the area is strongly encouraged. Enclosed accessory structures shall not exceed ten feet in height.

3. that all reasonable measures to mitigate impacts on the shore environment will be taken during construction and subsequent maintenance, and that adequate performance guarantees are collected to insure this.

Section 6.020 Accessory structures, other than shore protection devices, which can be easily and economically removed prior to erosion or storm damage such as fences, gazebos and sheds, are exempted from the shoreline setback requirements for principal structures in this Article, except that no accessory structures (other than approved shore protection devices) which have a foundation or are permanent in either construction or location may be placed shoreward of the shoreline setback. A waiver is permitted for pumphouses required by the local public health department for fresh water supply. Permitted accessory structures which are placed shoreward of the shoreline setback shall be removed prior to erosion damage. Failure to do so is a violation of this Ordinance.

Section 7.000 SITE PLAN REVIEW

Section 7.010 Any lot or parcel which, in whole or part, falls within the Dune Overlay Zone shall not be used for the erection, relocation, expansion or reconstruction of a principal or accessory structure except upon receipt of a zoning permit from the Zoning Administrator. No zoning permit for a principal or accessory structure shall be issued for lands within this Zone until a site plan meeting the requirements of this Section and those of Section _____ (*Site Plan Review*) have been met.

Section 7.020 Additionally, the following requirements shall be met:

1. No grading or clearing of a site shall be done prior to issuance of a permit as required in this Ordinance.

2. Each individual lot of a subdivision shall require a separate zoning permit as required in this Section unless the project is constructed by a single developer under a PUD approval; then one permit for each phase of construction may be issued.

Section 7.030 All development in this Zone shall meet the following site plan submittal requirements:

1. Each application shall include a topographic map with two foot contour intervals, determined within the previous six months. Indication of the ordinary high water mark, the high risk erosion setback, if any, and the shoreline setback shall be included. Also included shall be the lot lines, vegetation line, beach line, crest of the first foredune, if any, crest of the bluffline, if any, and the crest of the first barrier dune ridge, if any.

2. All applications shall include a site plan showing in detail the location and extent of the proposed construction, including outbuildings, fences, shore protection devices, wells and drainfields, parking, access roads, and other areas to be covered by nonimpervious cover. This site plan shall include indications in feet of the vertical and horizontal structural footage involved in the project.

3. Each site plan shall indicate proposed plans for retaining the existing vegetation or providing for revegetation at the site to prevent or minimize wind and water erosion damage, to enhance the natural beauty of the site and to protect the dunes. Any proposed selective cutting to improve views of the lake as permitted in Section 12.020 shall also be depicted.

4. Each site plan shall indicate the specific mitigating measures to be taken to minimize impacts on the environment.

5. The Zoning Administrator may waive any of the submittal requirements of Section 7.030 for applications for additions to a principal structure, or for an accessory structure, if s/he finds doing so will not materially impair the administration of this ordinance and the achievement of its purposes. Any such waiver shall be documented in writing and the reasons for granting it indicated and maintained with the file on the request.

Section 7.040 A site investigation report shall accompany the site plan submitted pursuant to Section 7.030 for the following uses: all development involving four or more dwelling units or more than 3,500 square feet of surface area; for all PUD's; for all water dependent land uses, and for all logging, farming and livestock operations. The site investigation report shall be prepared by a person or team of persons qualified by experience and training to assemble and analyze physical conditions in a shoreline area with dune and other unique environments. At the applicant's choice, the person or team shall be selected by the Zoning Administrator with the cost paid by the applicant, or employed by the applicant but subject to approval as to qualifications by the Zoning Administrator.

The site investigation report shall provide information on the site and adjacent land that is likely to be affected. The boundaries of the area to be covered in the report shall be as determined by the Zoning Administrator and shall include all lands within 200 feet of the boundaries of the property in question. The site investigation report shall include the following:

1. The methods used in the investigation.

2. A general analysis of the local and regional topography and geology including all beach and dune forms and their relative activity.

3. A history of any problems on and adjacent to the site, which may be derived from discussions with local residents and officials and the study of old photographs and government reports.

4. A topographic base map of 1 to 100 scale and with a contour interval of two feet identifying the following features:

a. the position of the lot lines;

b. the boundaries of the property;

c. the existing vegetation line and beach line;

d. identity of each dune classification type;

e. the crest of the foredune;

f. areas of open sand and the boundaries and species identification of major plant communities;

g. any springs, streams, wetlands, marshy areas or standing bodies of water;

h. areas subject to flooding including those shown on the flood hazard maps prepared under the HUD National Flood Insurance Program or mapped by state or local authorities;

i. wave cut terraces, erosion scarps and areas exhibiting significant surface erosion due to improper drainage and run-off concentration;

j. the location of any proposed development including any structures, paved areas, landscaped areas, wells and drainfields;

k. the source and date of collection for the base map information.

5. Profiles extending across the site and area of impact parallel to the direction of major elevational change on the site and passing through the intended position of any structure. Vertical and horizontal scale shall be 1 inch = 25 feet. Each profile shall show where applicable:

a. elevations in relation to the ordinary high water mark, and existing water level if higher;

b. the position of the beach line;

c. the position of the vegetation line;

d. sites of erosion and accretion;

e. the position of the crest, lakeward and shoreward edges of the foredune, and any open sand areas crossed by a profile;

f. the position and height of the structure(s), paved areas and areas where cut and fill is proposed for the construction.

6. The percent and location of the surface of the site which will be covered by impermeable or semipermeable surfaces.

7. The extent and type of surface soil formations must be determined, illustrated, and related to the vegetation of the site, the proposed activity on the site, and the location of the site.

8. Points of proposed access to the beach.

9. A description of the impact of the development on any unique biological habitats as identified by the Michigan Natural Features Inventory on file with the Michigan Department of Natural Resources, or any other unique plants or plant communities that are known to exist on the site.

10. A dune stabilization program for the development which meets the requirements of PA 347 of 1972 and which describes:

a. the stability and movement of sand and shoreline;

b. how much of the site will be exposed during construction and what measures will be taken to reduce wind erosion and sand movement during construction;

c. a revegetation program designed to return open sand areas, both preexisting and newly created, to a stable condition, to be initiated as soon as possible following construction and for the maintenance of revegetated areas for at least two years after the time of planting;

d. the time of commencement of revegetation planting.

11. If a well or a septic system with a drainfield is planned, the following shall be determined:

a. the maximum and minimal levels (seasonal extremes) in water table height;

b. the expected water needs of the proposed development;

c. the water supply capacity of the dune system and the expected effect of the increased water consumption on the water table draw-down taking into account water use rates to meet present and future needs of adjacent properties;

d. any detrimental contamination of the ground water, lakes or marshes that may occur.

12. Ground photographs of the site including:
    a. the date of the photographs and their relationship to the topographic map and profiles;

    b. a view of the general area;

    c. any features which are important to the interpretation of the hazard potential of the site, including all sites of erosion or accretion;

    d. unusual natural features and important wildlife habitat;

    e. views of the lakeward and landward sides of the foredune and first barrier dune ridge;

    f. the specific location of the proposed development.

13. The site investigation report for a logging, farming or livestock operation shall identify areas to be protected from vegetation loss or ground water pollution and means for protection.

14. The site investigation report shall include a plan for the long term maintenance of any shore protection, vegetation, access or dune stabilization elements of the development proposal.

15. Conclusions stating whether the intended use of the land is compatible with the standards of this ordinance and any existing or potential hazards noted during the investigation. Mitigating recommendations for specific areas of concern shall be included. Conclusions shall be based on data included in the report, and all sources of information and facts shall be clearly and specifically referenced.

Section 7.050 Based on the information and recommendations provided on a site plan or a site investigation report, the Zoning Administrator (*or Planning Commission*) may recommend that conditions be imposed on the proposed development for the purposes of safety, health and welfare, and in keeping with the purposes of this Zone. Such conditions shall meet the requirements of Section 20.000.

Section 7.060 Approval of site plans required under Section 7.030 shall be made by the Zoning Administrator. Approval of site investigation reports under Section 7.040 shall be made by the Planning Commission. The decision to approve, deny, or approve with conditions shall be written along with the conclusions of the approval body on the request. The decision may be appealed to the Board of Appeals who shall be bound by the purposes, standards, and requirements of this ordinance in the same way as the Planning Commission.

Section 7.070 The Zoning Administrator or Planning Commission may require that natural building materials and earth tone colors be used in the construction and exterior finishing of any structure on the site. Additional requirements to preserve a natural shoreline appearance may also be imposed provided these requirements alone do not result in a cost increase above 10%

of the total development cost necessary to meet other requirements in this ordinance.

Section 7.080 Site plan review requests shall be processed per the requirements of Section _____ (*Site Plan Review*) and any applicable procedures for special land uses and planned unit development provisions of Sections _____ and _____ respectively.

Section 7.090 Modifications to an approved site plan shall be made only with the mutual agreement of the approving authority and the property owner.

Section 7.100 All approved site plans and conditions attached thereto as required under section 7.040 and all subsequent amendments thereto shall be recorded with the County Register of Deeds.

Section 7.110 To insure compliance with this ordinance and any conditions imposed upon permit approval, the Planning Commission may require that a cash deposit, certified check, irrevocable bank letter of credit, or surety bond acceptable to the Township covering the estimated cost of improvements or required conditions be deposited with the Clerk of the Township to insure faithful completion of the improvements. The performance guarantee shall be deposited at the time of the issuance of the permit authorizing the activity or the project. Any cash deposit shall be returned in reasonable proportion to the ratio of the work completed on the required improvements.

Section 8.000 LOT REGULATIONS

Section 8.010 The minimum lot size of all lots created after the effective date of this Article shall meet the requirements below and have adequate lot depth to meet the shoreline setback (see Section 10.000) at the time it will be used for structural development, while still meeting the front yard setback.

Use	Minimum Lot Size & Density
1 single family residential dwelling	5 acres
2-3 dwelling units	8 acres for 2 units, 12 acres for 3 dwelling units, all units can be clustered together (also see Section 8.040)
4 or more dwelling units or multifamily development	4 units/16 acres plus 2 acres for each additional dwelling unit
all nonresidential uses	5 acres plus 1 acre for each 1000 sq. ft. of interior space, or portion thereof over 2,000 sq. feet.

Section 8.020 The minimum lot width for all lots shall be at least 245 feet. Side lot setbacks shall be the minimum established in the underlying district, but not less than 25 feet except as provided in Section 8.040. Building height shall be restricted to 35 feet or not higher than the horizon line as viewed from

Lake Michigan, whichever is less. Buildings shall not be sited so as to eliminate lake views from existing backlot developments if feasible.

Section 8.030 Water supply and waste disposal shall be approved by the ____ Public Health Department. If the development is 20 units or larger in size, then there must be public water and sewer service to the development. Wells and septic systems must comply with the following requirements:

1. they must conform to the shoreline setback for the principal structure;

2. wells and septic systems shall be at least 100 feet apart.

Section 8.040 Single family residences may be developed on 3.5 acre lots instead of 5 acres each as is required in Section 8.010, provided that a single access drive is used which provides unencumbered access to either owner, and provided a single shared access path to the beach is developed and maintained. If the local public health code permits shared septic systems then one may be installed. No minimum side yard setback must be maintained on the shared side if this option is selected, thereby permitting shared wall construction at the owner's choice. The minimum lot width for development under this Section shall be 220 feet.

Section 9.000 Reserved for Future Use
Section 9.010

Section 10.000 DUNE DEVELOPMENT STANDARDS
Section 10.010 All buildings and structures in the Dune Overlay Zone, except for approved shore protection devices, shall conform to the following standards:

1. No building or structure shall be constructed between the lake and the shoreline setback except for an approved shore protection device which has received all necessary federal, state and local permits. Likewise, no development is permitted on the windward face of the first barrier dune ridge that lies partially or completely within 200 feet landward of the first foredune crest.

2. All buildings or structures shall maintain a shoreline setback of at least two-hundred (200) feet landward of the first foredune crest; except that where this would locate a principal structure upon the windward face, on the crest, or less than fifty (50) feet landward of the crest of the first barrier dune ridge, said structure shall be set back further, to at least fifty (50) feet landward from the crest of the first barrier dune ridge. In those areas that do not have foredunes, the setback shall be measured from the bluffline, or where there is no bluffline, from the line of permanent vegetation. Wherever a greater setback established under the Shorelands Protection and Management Act, PA 245 of 1970 exists to protect structures subject to high risk of erosion, the greater high risk erosion area setback shall apply and shall not be subject to waiver or variance except as permitted under PA 245 of 1970 and rules established thereunder.

3. On the stabilized slopes of dunes where vegetation is firmly rooted and where grades are between twelve (12) percent, and twenty-five

(25) percent, all buildings and structures shall comply with the following standards:

a. construction shall be based on platform or other building designs which do not significantly disturb the natural environment;

b. basements shall be above grade level and have full height windows;

c. building pads for one dwelling unit or nonresidential structure are limited to a maximum of 2,000 square feet;

d. natural vegetation is retained except as otherwise permitted in this district;

e. structures shall be designed to conform with the natural contours of the land so as to minimize land disturbing activities and site work.

4. On stabilized slopes where grades are less than twelve (12) percent, buildings and structures are permitted provided they meet the following site design standards:

a. natural vegetation is retained except as otherwise permitted in this district;

b. structures shall be designed to conform with the natural contours of the land so as to minimize land disturbing activities and site work;

c. contours are shaped so as to merge with the existing terrain, where grading or filling is necessary;

d. steep banks and sharp corners are avoided;

e. runoff is dispersed (not concentrated) and where intensive runoff is unavoidable, crushed stone, flagstone, or other means and materials to prevent erosion are utilized.

5. No structure is permitted on slopes in excess of 25% except for an approved stairway or lift.

6. Where more than one dwelling unit or nonresidential structure are to be constructed, common garage and driveway facilities shall be utilized wherever feasible to reduce the amount of land that is disturbed.

7. Development shall not result in the clearance of natural vegetation in excess of that which is necessary for the structure, required access, and the required well, septic or sewage disposal system.

8. Natural non-wooded areas which are suitable for development shall be used instead of areas which must be artificially cleared, unless it is an area of active sand movement.

9. Sand and bluff stabilization shall be required during all phases of construction and post-construction as specified by standards set forth in the Soil Erosion and Sedimentation Control Act, PA 347 of 1972 and rules adopted thereunder.

10. Development shall result in the least topographic modification of the site as is possible.

11. Significant structural loads or structural fills to be placed on dune areas where compressible subsurface areas are suspected, shall be allowed only after a thorough foundation check and positive findings are reported.

12. The requirements for side and front yards, vision clearance, signs, parking and loading spaces shall be as provided in the underlying zone, unless specifically provided otherwise by this Article.

13. Logging activities shall be permitted landward of the shoreline setback provided each of the following standards are met:

a. they are conducted according to a selective cutting plan prepared by a professional forester and approved by the Zoning Administrator,

b. no clear cutting is permitted, except where the Forest Management Division of the Michigan Dept. of Natural Resources certifies that clear cutting is essential for management of specific tree species such as jack pine and aspen,

c. they are undertaken in a manner which maintains watershed run-off at the preexisting quality, volume and rate of flow, and

d. a 100 foot buffer strip is maintained landward of the shoreline setback within which only dead and diseased trees may be cut in accord with the approved cutting plan. This buffer is deemed critical to maintaining a natural appearing coastline and to prevent erosion of dunes closest to the lake. All natural vegetation including trees, shall be retained within 50 feet of streams, ponds and marshes.

14. Livestock grazing and other farming is permitted landward of the shoreline setback, provided it is done in accord with best management practices established by the Dept. of Agriculture, Soil Conservation Service and Cooperative Extension Service.

15. The total nonimpervious surface area of the lot, including the principal structure, accessory structures, paved drive and parking areas, patios and other accessory uses shall not exceed 10% of the total area of the lot; except on nonconforming lots of record, where it shall not exceed 30% of the total lot area.

Section 10.020 The required setback established in Section 10.010 (2.) may be waived up to 30% by the Planning Commission when application is made

therefore as part of the site plan review process and when the Planning Commission establishes that the following circumstances exist:

1. the applicant demonstrates that because of heavy tree cover or a higher dune lakeward of the shoreline setback, no reasonable view of the lake would exist for a structure erected at the shoreline setback, or if existing principal or accessory structures on adjoining lots that are built closer to the lake than is now permitted under these regulations would block a reasonable view of the lake by virtue of their location within 45 degrees either side of a line perpendicular to the lake whose beginning point is a corner of a proposed principal structure at the shoreline setback; and

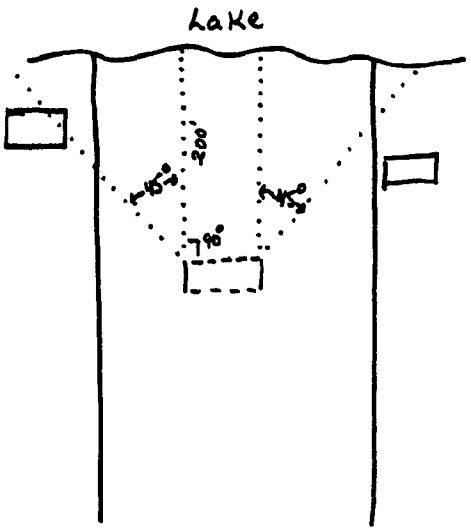
2. that waiver of the setback would not:
   a. significantly increase the risk of erosion to the dune because of the large size, design, or proposed use pattern of the property; and

   b. result in a structure being placed closer than 50 feet to a bluffline or crest of the first barrier dune ridge; and

   c. the provisions of Section 12.010 and 12.020 are still complied with; and

   d. no construction on the windward face of the first barrier dune ridge would occur; and

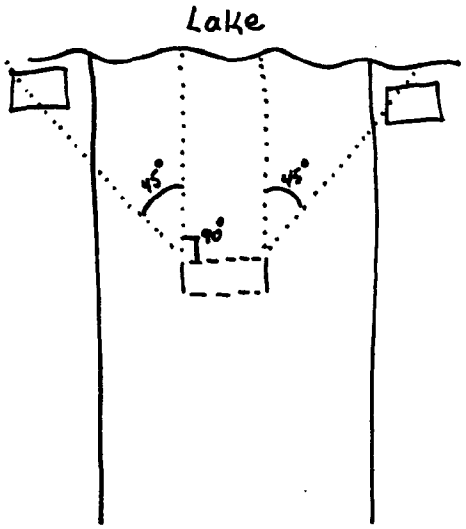
   e. the waiver would not bring the structure closer to the lake than would be permitted under high risk erosion area setback requirements of PA 245 of 1970.



Waiver request should be denied, because if house is moved to the center of the lot, then no waiver is necessary.

Section 10.030 In determining the extent of the waiver to allow under Section 10.020, the Planning Commission shall insure conformance with the spirit and intent of this ordinance as established in its purposes and specific regulations and shall grant the minimum amount of waiver necessary to permit a reasonable view of the lake. In making this determination the Planning Commission shall be especially careful in the exercise of their authority to insure that all public purposes of this ordinance are protected to the extent practicable and to be conscious of the cumulative long term effect of multiple waivers on adjoining parcels. The Planning Commission shall document the facts and the basis for their decision on any such waiver granted. A waiver shall be recorded as a part of the approval of a site plan and may be appealed to the Board of Appeals which shall be subject to the same standards as guide the Planning Commission in the exercise of this responsibility.

Section 10.040 If an unobstructed view can be obtained without a waiver by siting a principal structure within required sideyard setbacks, then such location shall be used instead of any other location that might otherwise be granted by waiver pursuant to Section 10.020 and Section 10.030.



Waiver request should be approved, because no matter where house is placed at the shoreline setback line, a reasonable view is blocked by adjoining structures. A waiver of 20' (10%) eliminates any obstruction within the 45 degree viewing area.

Section 11.000 ACCESS REGULATIONS

Section 11.010 The following access requirements apply to all development in the Dune Overlay Zone:

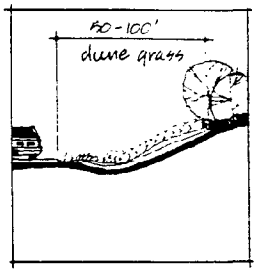
1. Wherever possible, roads and pathways shall be located in areas where vegetation has stabilized the dunes and shall be constructed in a manner that minimizes disruption to the dune.

2. Roads or driveways shall be located behind the shoreline setback. Where the dune extends landward a considerable distance, access roads or driveways shall respect the natural topography and may be run in a dry trough between dunes and and/or through natural gaps within the dune system. The natural topography of dune crests shall not be altered unless no other means of access is feasible.

3. When practical, shared access drives, roads and utility easements will be encouraged. Whenever two or more dwelling units will be established on the same parcel pursuant to Section 8.040 they shall be required.

4. Roads or driveways shall have beach grass (Ammophila breviligulata Fernald) or other suitable material planted and maintained in a living condition on areas of open sand to a distance of fifty (50) feet adjacent to each side of the road or driveway.

plantings on road shoulders



5. No vehicles shall have access shoreward of the shoreline setback except where public access has been provided, is approved and is lawful. No off-road vehicle use is permitted from the shoreline to the inland boundary of a barrier dune except in DNR designated areas, and on the access drive providing access to an approved structure.

6. Parking shall be limited to space necessary to meet the needs of the permitted use and shall be sited and screened along with the principal use pursuant to the standards applied during the site plan review process.

7. If a pathway or trail to the shore is to be used by more than two families, or would cause erosion or damage to non-vegetated or vegetated sand areas, raised boardwalks or stairs shall be erected. Such a structure shall not be designed so as to cause any weakening or damage to the bluff or dune.

8. Stairways or lifts shall be designed so as to avoid placement on dune faces unless there is no other feasible alternative. Even then, approval may be conditioned on a design, color and materials that blends the structure into the dune environment, and the planting of obscuring vegetation where appropriate.

Section 12.000 PRESERVATION OF NATURAL SHORE VEGETATION

Section 12.010 Preservation of natural shore vegetation is critical to minimizing the destructive effects of wind and water erosion, it also protects the scenic beauty of the shoreline. To minimize destruction of native vegetation, removal of vegetation beyond that authorized in an approved site plan is prohibited. This provision shall not apply to the removal of dead, diseased, or dying trees at the discretion of the landowner, provided also that where such removal of dead vegetation occurs, the open area thereby created shall be replanted within 90 days with vegetation native to the area including: _____.

(see pages 2-34 & 2-35 in Michigan Great Lakes Shoreland Zone Boundary Definition, MSU, June 1975 reproduced in Appendix A.).

Section 12.020 Selective cutting of trees to provide a better view of the lake is permitted provided the proposed selective cutting is done in conformance with the following standards:

1. No tree cutting is permitted on a foredune.

2. Vegetation lakeward of the shoreline setback may be selectively cut, provided each of the following standards is met:

   a. an area equal to no more than 30% of the width of the lot as measured from the lot width at the shoreline setback line, may be selectively cut of vegetation or an area not more than 30 feet wide for each 100 feet of shoreline, whichever is less.

   b. selective cutting shall leave sufficient vegetation to screen cars, dwellings, and accessory structures as seen from the water, to preserve natural beauty and to control erosion.

   c. natural shrubbery and low vegetation shall be preserved as far as practicable, and where removed, it shall be replaced with other vegetation native to the area that is equally effective in retarding runoff, preventing erosion, and preserving natural beauty.

   d. where selective cutting would result in exposed sand and/or significantly increase the chance of serious wind or water erosion it shall not be permitted.

Section 13.000 FILLING, GRADING, LAGOONING AND DREDGING

Section 13.010 No filling, grading, lagooning or dredging in the waters of the Great Lakes or on the adjacent beach, or in a tributary flowing thereinto, shall be permitted without obtaining necessary state and/or federal permits, and then only for erosion control devices as authorized by this Ordinance. No filling or grading shall be permitted between the ordinary high water mark and shoreline setback area except for state and federally permitted beach nourishment activities, or the installation of approved shore protection devices.

Section 13.020 Filling and grading of sand dunes landward of the shoreline setback shall be permitted only according to an approved site plan and approved Soil Erosion and Sedimentation Control Permit, and only when:

1. the smallest amount of bare ground is exposed for as short a time as is feasible.

2. the area is to be revegetated or built upon immediately after creation of the bare ground.

3. fill will be stabilized according to accepted engineering standards.

4. it is done according to a filling and grading plan prepared by a licensed engineer or licensed landscape architect. This plan shall show the area to be filled, the current and proposed contour, the nature and source of fill material to be used.

5. no fill is placed in an established floodplain or wetland.

6. no fill will cause surface water to collect or to run off onto adjoining lands contrary to existing natural drainage.

7. fill material will not unreasonably cause blowing dust, grime, fumes or odors and not cause any fire hazard or be composed of combustible material.

8. filling operations will not be conducted before sunrise or after 10:00 PM local time.

9. that the transportation of fill will be made in trucks or vehicles properly suited to such transport and which are covered so as to insure fill will not spread upon the public roads of the Township.

10. that a performance guarantee is collected to insure conformance with an approved filling plan for any fill amounts in excess of 200 cubic yards.

Section 13.030 In the case where grading of the site has taken place after a zoning permit is granted, but no progressive construction has taken place within 30 days, the Zoning Administrator may prescribe restoration of vegetative cover to minimize erosion damage to the site. Within 90 days of beginning construction, efforts to revegetate areas exposed by grading and construction must be undertaken. Failure to comply constitutes a violation of this Ordinance.

Section 14.000 SAND AND SOIL REMOVAL

Section 14.010 No soil, sand, gravel or other material shall be permitted to be removed from lands within this Zone except as may be authorized by a permit granted under PA 222 of 1976, the Sand Dune Protection and Management Act; or as may be incidental to the establishment of a permitted use approved by a site plan under the terms of this Article. Incidental soil, sand or gravel removal shall conform with the following standards:

1. removal for the purpose of constructing a basement shall be permitted, but soil removed shall be retained on the site when doing so does not enlarge the risk of erosion, or create another threat to the development or the natural environment.

2. no dune shall be cut down in elevation between the lakeshore and the shoreline setback.

Section 15.000 OVERLAPPING JURISDICTION

Section 15.010 In addition to the approvals and permits required and specified in this Ordinance, the Zoning Administrator shall, prior to the issuance of any zoning permit, be satisfied that permits for the particular development and/or construction have been applied for from such state and/or federal or local agencies having jurisdiction; and further that said Zoning Administrator may either withhold granting a zoning or other development permit for activities within this Zone until pertinent state or federal agencies have taken final action on permits pending before them, when it is apparent that such permit(s) are necessary in order for the project to proceed. A building permit which is usually not issuable until after a zoning permit has been obtained,

shall not constitute *a permit necessary in order for the project to proceed*, as the term is used in this Section.

Section 16.000 NONCONFORMING PRINCIPAL STRUCTURES

Section 16.010 The lawful use of any principal structure existing at the time at which this Zone is adopted may continue in the same manner and to the same extent even though the location of the principal structure does not conform with the provisions of this Ordinance. A nonconforming principal structure shall not be repaired, restored, extended, enlarged or removed except in accord with the requirements that follow:

Section 16.020 Routine Maintenance and Remodeling

Routine repairs and maintenance work required to keep a nonconforming principal structure in sound condition are permitted. Remodeling of a nonconforming principal structure is permitted as long as the structure is neither enlarged nor extended in a nonconforming manner. A structure may be returned to its original condition without the authorization required in Section 16.030 if damaged less than 25 percent of the structure's replacement cost as determined by Section 16.060.

Section 16.030 Restoration of Nonconforming Structures

Except as provided below, the Zoning Board of Appeals shall not authorize restoration of a nonconforming structure unless the Board determines that the structure will be restored in compliance with the following standards:

1. the restoration does not exceed 60% of the replacement value of the structure in a 12 month period. If, in any 12-month period, the cost of restoring the nonconforming structure is in excess of 60% of its replacement value, the requirements for new permanent structures shall apply;

2. when restoration would not violate the spirit and intent of this Ordinance;

3. the following conditions are required as applicable:

   a. approved measures which will aid in stabilizing the dune or bluff other than the construction of erosion control devices are installed.

   b. the use of runoff or soil erosion control techniques to prevent any accelerated erosion which may occur during restoration of the structure are implemented according to an approved soil erosion and sedimentation control plan.

   c. the principal structure to be restored is relocated further back from the eroding bluff when the Zoning Board of Appeals determines that the structure is likely to suffer erosion damage within three years based on average annual recession rates calculated in the shoreland erosion studies conducted pursuant to P.A. 245 of 1970, as amended.

   d. that all debris resulting from the damage or from the restoration of a principal structure are lawfully disposed of in a manner such that the debris poses no safety or health hazard.

e. other conditions imposed by the Board of Appeals on the restoration of the nonconforming principal structures in order to protect the public health, safety, or general welfare, and the spirit of this ordinance are met.

Section 16.040 Enlargement or Extension of Nonconforming Structures
The Zoning Board of Appeals shall not authorize the enlargement or extension of any principal structure in a manner which does not conform with the setback or variance requirements of this Ordinance.

Section 16.050 Determination of Replacement Costs
The precatastrophy replacement cost of repairing damage to a nonconforming structure, excluding contents, damaged by erosion, flood, fire or other means, shall be made on the basis of an appraisal by a qualified individual designated by the Board of Appeals. The cost for such determination shall be born by the applicant.

Section 17.000 USE OF NONCONFORMING LOTS
Section 17.010 A special use permit pursuant to the provisions of Section _____ *(Special Land Use Section)* may be granted to install a movable structure on a nonconforming lot which lacks adequate depth to meet the required setback if all of the following provisions are complied with:

1. If a sanitary sewer is not used, the septic system, tile field, or other waste handling facility shall be located on the landward side of the movable structure, and if feasible, behind the shoreline setback line.

2. The movable structure shall be located as far landward of the dune crest as the front yard setback in the underlyling district permits.

3. The movable structure shall be designed and constructed in accordance with proper engineering standards and building moving restrictions applicable to the subject area. Review and approval of the design shall be incorporated into the permit process. All construction materials, including foundations, shall be removed or disposed of as part of the moving operation. Access to and from the structure shall be of sufficient width and acceptable grade to allow for moving of the structure.

Section 17.020 If a nonconforming lot does not have access to and from the structure of sufficient width and acceptable grade to allow for a movable structure, a special use permit meeting all other development standards may be granted to authorize a permanent structure, provided an erosion control device is approved in place of a portion of the minimum setback requirement. The requirement for an erosion control device may be waived upon a showing that it would serve no useful purpose. The special use permit shall be granted only if all of the following provisions are complied with:

1. If a sanitary sewer is not used, the septic system, tile field, or other waste handling facility shall be located on the landward side of the permanent structure and if feasible, behind the shoreline setback line. If there is not adequate space for one, a system meeting the approval of the _____ Health Dept. shall be installed.

2. The permanent structure shall be located as far landward of the first foredune crest as feasible while still insuring the front yard setback in the underlying district is maintained.

3. The erosion control device shall be designed to meet or exceed proper engineering standards for the Great Lakes, and a professional engineer shall certify that the device has been designed and will be constructed in accordance with these standards.

Section 17.030 A lot of record or a lot which is described in a land contract or deed executed and delivered before the effective date of this Article which does not meet the lot area or width requirements of this Article are nonconforming lots of record. A principal structure may be built upon these lots without a variance for lot width or area, provided

1. The proposed structure and use meets all other requirements of this Article (*thus the setback requirements have to be met unless waived under Section 10.020, or a special use permit under section 17.000 is granted, or a variance under Section 18.000 is granted)*; and

2. If a person owns two or more contigous lots of which one or more is a nonconforming lot of record, these lots shall be combined in such manner as to meet as nearly as possible, the minimum area and width requirements of this Article. Thereafter, such combined lots shall be treated as one lot for the purposes of meeting the requirements of this ordinance.

Section 18.000 VARIANCES

Section 18.010 A variance from the shoreline setback for principal structures may be granted by the Zoning Board of Appeals under the exceptional circumstances described below, but then only if the conditions described hereafter are complied with:

1. The lot is a preexisting nonconforming lot of record or is a lot described in a deed or land contract executed prior to the effective date of this Article, and lacked adequate depth to comply with the minimum setback for principal structures, OR

2. The lot was created in full compliance with this ordinance, but at the time of application to establish a principal structure, lacked sufficient depth because of natural erosion processes, or a natural feature, such as a ravine, making practical use of the lot difficult.

Section 18.020 Where the unique characteristics of a lot of record in conjunction with the requirements of this ordinance so combine to prevent a reasonable use of land, the Board of Appeals shall grant the minimum variances from pertinent ordinance requirements to permit a reasonable use. In making such a determination, the Board of Appeals shall record in writing that the applicant has demonstrated that each of the following findings exists:

1. The specific characteristics of the lot as affected by the development regulations make the property unique and present the circumstances which if enforced would prevent a reasonable use of the property;

2. that the applicant has attempted to receive and been denied approval of a site plan, special use permit, and PUD, and that no other use of the property under this ordinance exists. If the Board of Appeals finds another development option exists which appears feasible and has not been explored by the applicant, including rezoning of the land, but not including spot zoning or text changes to this ordinance, then the Board shall so state and refuse to further consider the variance request until and unless the applicant has been denied approval of this option. This qualifier may be ignored by the Board of Appeals if the applicant has had development proposals pending before the Township without an affirmative approval for over 18 months and if the delay is the result of Township inaction and not because of applicant delays. Likewise, if a prior development proposal was approved but not acted upon by the applicant, the Board of Appeals shall not entertain a request for a variance based on a claim that no reasonable use of the property is permitted.

3. That grant of such a variance will not create any hardship or nuisance on an adjoining property owner or the public that is greater than any benefit received by the applicant by approval of the variance;

4. That the situation from which the applicant is seeking relief is not self-created.

5. That the grant of the requested variance will be the minimum necessary to permit a reasonable use, and prevent an unfair burden to be borne by the applicant making the request.

Section 19.000 APPEALS TO CIRCUIT COURT

Section 19.010 Decisions of the Zoning Board of Appeals, Planning Commission, and Zoning Administrator on decisions related to this Article, may be taken to the Circuit Court after local appeals before the Zoning Board of Appeals have been exhausted. Such appeals must be filed within 30 days of the decision of the Board of Appeals.

Section 20.000 CONDITIONS

Section 20.010 Conditions may be imposed on site plans, special land uses, PUD's and variances provided such conditions shall meet all of the following requirements:

1. Be designed to protect natural resources, the health, safety, and welfare and the social and economic well being of those who will use the land use or activity under consideration, residents and landowners immediately adjacent to the proposed land use or activity, and the community as a whole.

2. Be related to the valid exercise of the police power, and purposes which are affected by the proposed use or activity.

3. Be necessary to meet the intent and purpose of this Zoning Ordinance, be related to the standards established in this Ordinance for the land use or activity under consideration, and be necessary to insure compliance with those standards.

4. Any of the forelisted standards applying to development of new structures on new lots after the effective date of this ordinance, may also be required as conditions on nonconforming lot and variance approvals, as in the opinion of the Board of Appeals, it is necessary or desirable to do so.

Section 21.000 HOLD HARMLESS PROVISIONS

Section 21.010 The provisions of this ordinance do not guarantee that erosion, dune slumping, or other hazards protected against will not befall property owners building under the terms of an authorized permit, or that no damage will inadvertently befall an adjoining landowner as a result of an approved development; therefore these provisions and any permit issued thereunder shall not be construed to impose any legal or moral obligation upon ____ Township or its elected or appointed officials. Nor shall issuance of any permit under this section and proper conformance thereto by a property owner relieve that owner from any civil liability claims initiated by other property owners.

Section 22.000 DEFINITIONS

Accessory Structure: A building or other structure, the use of which is incidental to that of the main structure or use of the land. Within the shoreline setback except for approved shore protection devices, an accessory structure shall not have a permanent foundation and shall be constructed to be easily moved or removed.

Barrier Dune: The first landward sand dune formation along the shoreline of Lake Michigan as designated by the Department of Natural Resources pursuant to PA 222 of 1976 or as delineated by _____ Township on the _____ Township Zoning Map.

Beach: Flat, often sloping area of sand and other unconsolidated shore materials that extend from the waters edge landward to a point where either the growth of permanent vegetation occurs or a distinct change in slope or elevation alters the configuration of the land form.

Bluffline: The line which is the edge or crest of the elevated segment of the shoreline above the beach which normally has a precipitous front inclining steeply on the lakeward side.

Clearcut: Land areas from which nearly all trees, brush and other woody vegetation have been removed.

Crest: The top or crown of a dune.

DNR: The Department of Natural Resources.

Dunes Subject to Regulation: This includes all barrier dunes designated pursuant to PA 222 of 1976, the Sand Dune Protection and Management Act, as well as all areas designated as sand dunes by the Township of _____ and subject to the regulations established in this Ordinance.

Earth Tones: Colors indigenous to the immediate site in a natural setting in the midsummer. This would include greens, browns and grays for example in wooded areas; and tans, browns and beiges in sandy areas.

Feasible and Prudent Alternative: Under the Michigan Environmental Protection Act it is the obligation of a proponent of change that is alleged to, or which may create, a harmful effect on the environment to demonstrate that there is no *feasible and prudent alternative* to the proposed action. In **Wayne County Dept. of Health v. Olsonite Corp,** 79 Mich App 668, the court outlined the basic elements of this obligation. First, the proponent of change must do more than merely show that taking preventative action will reduce profits, nor can possible alternatives be ignored solely because they do not guarantee successful amelioration of the threatened environmental harm. The approach must be *likely to work or to be put into effect successfully.* The term *prudent* does not mean balancing competing interests, rather it involves consideration of any *truly unusual factors, costs of extraordinary magnitude,* or truly *unique problems* associated with the alternative. (Source: ***Environmental Law in Michigan***, University of Michigan Law School, 1982, p. 133-134).

First Barrier Dune Ridge: The first landward ridge of dunes which is not considered a foredune.

First Foredune: The most lakeward foredune ridge.

Foredune: Low, linear dune ridge(s) parallel and adjacent to the shoreline. The windward face is often gently sloping; it may be vegetated with dune grasses and low shrub vegetation or may have an exposed sand face. These dunes seldom attain a height of more than 30 feet.

High Risk Erosion Area: An area designated as a high risk area due to shoreland erosion by the Department of Natural Resources pursuant to the Shorelands Protection and Management Act, PA 245 of 1970, as amended.

Marina: A facility which is owned or operated by a person, extends into or over an inland lake or stream and offers service to the public or members of the marina for docking, loading or other servicing of recreational watercraft.

Movable Structure: A principal structure which is determined to be movable based on a review of the design and size of the structure, a review of the capability of the proposed structure to withstand normal moving stresses and a site review to determine whether the structure is accessible to moving equipment.

Nonconforming or Substandard Lot: A lot of record or a lot which is described in a land contract or deed executed and delivered before the designation of a high risk erosion area or the boundaries of the Dune Overlay Zone, and which does not have adequate lot area or width, or adequate depth to provide the minimum required setback from the bluffline for a permanent structure. The term also means those lots which are legally created after the designation of a high risk erosion area, which have sufficient depth to meet setback requirements for permanent structures, but which subsequently become substandard due to erosion processes. (*This is a more specific definition than usually occurs in local zoning ordinances and should be modified accordingly.*)

Ordinary High Water Mark: For Lake Michigan this has been determined to be 579.8 feet above IGLD (International Great Lakes Datum). For purposes of this Ordinance, the juncture of the toe of the foredune and the beach is a more readily identifiable location than the ordinary high water mark and may be used whenever ordinary high water is specified.

Principal Structure: A residential, commercial, industrial or institutional building that forms the primary structure or building on a lot.

Selective Cutting: The removal of some, but not all trees, shrubs and other brush and the pruning of others to provide a clearer view of the lake from a permanent structure. It does not mean clear cutting.

Shoreline Setback: The distance required to obtain an open space between the crest of the foredune (or the line of permanent vegetation if there is no foredune) and structures to be erected on a lot. In the event the crest of the foredune recedes (moves landward), the shoreline setback line shall also be construed as having moved landward a distance equal to the recession. The shoreline setback shall be measured in a landward direction as a distance horizontal from and perpendicular to the crest of the first foredune (or the line of permanent vegetation where there is no foredune). It shall be construed as running parallel to the crest of the foredune. If a high risk erosion study pursuant to PA 245 of 1970 establishes a greater landward setback than the shoreline setback, it shall be the shoreline setback for the purposes of this ordinance.

Soil Erosion & Sedimentation Control Act: Public Act 347 of 1972. An Act regulating soil disturbance and requiring permits from the local soil erosion and sedimentation control officer before site development may begin.

Structure: Anything fabricated, constructed or erected which requires fixation or placement in or on the ground or to another structure which is affixed or placed in or on the ground. The term shall include signs and billboards, but in the Dune Overlay Zone shall exclude stone, wooden and other fences which are permitted provided they do not have a permanent foundation and do not detract from the natural appearance of the shoreline.

Water Dependent Land Use: A use of land which by its very nature is dependent on a waterfront location and which is specifically listed in Section 5.040.

Yard: Backyard - The Lake Michigan side of lots shall be considered the backyard, for properties in the Dune Overlay Zone, which lots shall meet the shoreline setback standards of the Dune Overlay Zone and not those of the underlying district.

Chapter Five

CONSIDERATIONS IN DEVELOPING LOCAL REGULATIONS BASED ON THE SAMPLE ORDINANCE

The sample zoning language presented in the last chapter presents one alternative for meeting the objectives of environmentally sensitive sand dune development. However, other equally effective approaches could be developed. Because this is true, local units of government should be given considerable latitude in developing local zoning language that meets basic minimum requirements such as those presented in Chapter Four. No single "model" should *be required* to meet state standards for adequate control of sand dune development.

For example, a local governmental unit could adopt only half the sample ordinance in some instances, and still *have the bases covered.* This is due to the fact that most of the language after Section 16.000 of the sample ordinance is presented in case the local ordinance does not already have such language; if the local ordinance does (as most do), then merely a little modification of existing ordinance language would be all that is necessary. These Sections deal with nonconforming lots/uses, and variances. Additionally, if a community chose to not permit any water dependent land uses or development with four or more dwelling units or 3,500 square feet or more, then the entire procedure for a site investigation report could be eliminated (Section 7.040). In some communities with the most sensitive dune types this would be reasonable, and should be an acceptable way to meet state standards for regulation of dune development.

On the other hand, additional language may be necessary to utilize the sample ordinance in some communities. **The sample ordinance assumes** that the existing zoning ordinance already has in place procedures for processing site plan reviews, special land uses and planned unit development requests. *If these procedures are not present, they would have to be added in order to process these types of applications.*

Some communities may prefer to establish a separate zoning district instead of an overlay zone to regulate development in dune areas. With the caveats previously mentioned in Chapter Two in mind, this would be a very appropriate alternative in some communities, and as an option it should be permitted. The sample zoning language presented in the last chapter could be easily modified by the addition of use lists, front and side yard requirements and the delineation of district boundaries to serve as a separate zoning district. This would be most appropriate in communities already developed with *wall to wall* residential lots along the shoreline. Many if not most of these lots would become nonconforming under the sample overlay zone. As a result, a single district approach recognizing this fact may be more appropriate.

Another important local option that should be protected is the possibility of integrating sand dune protection language with requirements for development in areas subject to high risk from erosion. This would effectively establish regulations along nearly all (if not all the shoreline) for those communities using this approach. It is easily accomplished by adding only a few sections and broadening the definition of covered areas. Additionally, the issue of which

setback would apply (the most landward one) would also have to be specified. This option will be the option of choice for many communities along Lake Michigan which have both extensive sand dunes, and extensive areas at high risk of erosion from the high lake levels.

The best approach to managing development in sand dunes depends on very careful data collection and analysis that focuses on both the unique attributes of dunes within the community and the relationship of those lands to adjoining land uses and facilities. If done following a systematic survey of all dunes in the state, the information would exist for communities to understand more precisely the degree of sensitivity their dunes have relative to others in the state. This would permit refinement of development standards to a greater degree than is possible under a single set of sample regulations.

Even without a systematic statewide inventory of all dune lands, existing development, lot sizes and dune sensitivity, individual communities can undertake their own data collection and analysis to prepare an effective management plan for the dune lands in their community. Good planning will permit a community to wisely adapt the sample zoning regulations in this report to meet their unique concerns. It also provides the necessary legal basis for lawful regulation. Often this type of planning analysis is added to the community's master or comprehensive plan or placed in a separate report.

Please remember that the **sample ordinance assumes** that the basic standards and regulatory approach included within it are consistent with any requirements under a statutory sand dune protection scheme. Since none is presently in existence, the actual language of any sample zoning ordinance would need to be reviewed for conformance with a subsequently enacted statutory scheme. The principal point here is that while certain basic elements of regulation need to be provided for to insure adequate protection of sensitive dune resources, there are many different ways that this objective could be achieved. The option ought to be protected for each local unit to decide what structure it wants to use to implement state dune protection standards, ***provided conformance with basic minimum standards is achieved.***

Also, since the sample ordinance has been drafted by a community planner, and not by an attorney, it should be thoroughly reviewed, and refined as necessary, by local legal counsel in order to best be integrated into the existing local zoning ordinance. Conceivably, with the addition of some *front end* and *back end* language, it could also be adopted as a single purpose zoning ordinance (there must be at least two districts) or as a freestanding local ordinance in those half dozen shoreline communities that have no zoning ordinance at all, but still wish to better manage development in sand dunes.

It is hoped the sample ordinance language and background material in this report is satisfactory for bringing into focus the policy issues that need to be decided prior to enactment of protective legislation, and for encouragement of further local zoning to protect sand dunes.

APPENDIX A

PLANTS INDIGENOUS TO SAND DUNES

FOREDUNES

Ammophila breviligulata	beach grass
Calamovilfa longifolia	reed grass
Populus deltoides	cottonwood
Prunus pumila	sand cherry
Salix glaucophylloides	blue willow
Salix syrticola	sand willow
Vitis aestivalis	summer grape

SECONDARY DUNES AND DRYPANNES

Andropogon coparius	little bluestem
Arabis lyrata	rockcress
Arctostaphylos uva-ursi	bearberry
Artemisia caudata	wormwood
Asclepias spp.	milkwood
Cakile edentula	sea-rocket
Campanula rotundifolia	harebell
Cirsium pitcheri	pitcher thistle
Corispermum hyssopifolium	bug-seed
Cornus stolonifera	red-osier dogwood
Elymus canadensis	wild rye
Elymus malus	wild rye
Euphorbia corollata	flowering spurge
Euphorbia polygonifolia	seaside spurge
Hudsonia tomentosa	false heather
Hypericum kalmianum	St. John's wort
Juniperus communis var. depressa	ground juniper
Juniperus horizontalis	creeping juniper
Juniperus virginiana	eastern red-cedar
Lathlyrus maritimus	beach pea
Lithospermum croceum	hairy puccoon
Monarda punctata	horseming
Oenothera biennis	evening primrose
Ptelia trifoliata	wafer-ash, hop tree

STABLE DUNES

Abies balsamea	balsam fir
Acer rubrum	red maple
Acer saccharum	sugar maple
Fagus grandifolia	beech
Fraxinum spp	ash
Pinus banksiana	jack pine
Pinus strobus	white pine
Quercus rubra	red oak
Quercus velutina	black oak
Taxus canadensis	yew
Thuja occidentalis	northern white cedar
Tilia americana	basswood
Tsuga canadensis	hemlock

Source: ***Michigan Great Lakes Shorelands Zone Boundary Definitions,*** *MSU, June, 1975, p. 24-25.*